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STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

**NOTICE TO CONTRACTORS
AND
SPECIAL PROVISIONS**

**FOR CONSTRUCTION ON STATE HIGHWAY IN
RIVERSIDE COUNTY IN RIVERSIDE ON ROUTE 91 FROM 0.3 KM SOUTH OF MISSION INN AVENUE
UNDERCROSSING TO THE 60/91/215 JUNCTION AND ON ROUTE 60 FROM MAIN STREET
OVERCROSSING TO 0.2 KM EAST OF ORANGE STREET OVERCROSSING**

DISTRICT 08, ROUTES 60,91

**For Use in Connection with Standard Specifications Dated JULY 1999, Standard Plans Dated JULY 1999, and Labor
Surcharge and Equipment Rental Rates.**

**CONTRACT NO. 08-334834
08-Riv-60,91-18.9/19.2, R32.7/R34.8**

**Federal Aid Project
ACNH-X065(075)E**

**Bids Open: September 12, 2002
Dated: July 29, 2002**

OSD

IMPORTANT SPECIAL NOTICES

- The bidder's attention is directed to Section 5, containing specifications for "Dispute Review Board," of the Special Provisions, regarding establishing a Dispute Review Board (DRB) for the project.
- The Special Provisions for Federal-aid projects (with and without DBE goals) have been revised to incorporate changes made by new regulations governing the DBE Program (49 CFR Part 26)
- Attention is directed to Section 3, "Award and Execution of Contract," of the special provisions for special requirements for the time allowed for return of documents by the successful bidder.
- Attention is directed to Section 4, "Beginning of Work, Time of Completion and Liquidated Damages," of these special provisions for special requirements for beginning of work.

Sections 2 and 5 incorporate the changes. Bidders should read these sections to become familiar with them. Attention is directed to the following significant changes:

Section 2, "Disadvantaged Business Enterprise (DBE)" revises the counting of participation by DBE primes, and the counting of trucking performed by DBE firms. The section also revises the information that must be submitted to the Department in order to receive credit for trucking.

Section 2, "Submission of DBE Information" revises the information required to be submitted to the Department to receive credit toward the DBE goal. It also revises the criteria to demonstrate good faith efforts.

Section 5, "Subcontractor and DBE Records" revises the information required to be reported at the end of the project, and information related to trucking that must be submitted throughout the project.

Section 5, "DBE Certification Status" adds new reporting requirements related to DBE certification.

Section 5, "Subcontracting" describes the efforts that must be made in the event a DBE subcontractor is terminated or fails to complete its work for any reason.

Section 5, "Prompt Progress Payment to Subcontractors" requires prompt payment to all subcontractors.

Section 5, "Prompt Payment of Withheld Funds to Subcontractors" requires the prompt payment of retention to all subcontractors.

- **Payment Bonds**

Attention is directed to Section 5 of the Special Provisions, regarding contract bonds. The payment bond shall be in a sum not less than one hundred percent of the total amount payable by the terms of the contract.

- Federal minimum wage rates for this project are no longer included in the "Proposal and Contract" book. They will be available through the California Department of Transportation's Electronic Project Document Distribution Internet Web Site at <http://hqidoc1.dot.ca.gov/>. See Notice to Contractors.
- Attention is directed to Section 1, "Specifications and Plans," of these special provisions for Amendments To July 1999 Standard Specifications. Amendments to the various sections of the Standard Specification have been consolidated into Section 1 and dated to reflect the most recent revision.

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STANDARD PLANS LIST

The Standard Plan sheets applicable to this contract include, but are not limited to those indicated below. The Revised Standard Plans (RSP) and New Standard Plans (NSP) which apply to this contract are included as individual sheets of the project plans.

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B6-21	Joint Seals (Maximum Movement Rating = 50 mm)
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B11-52	Chain Link Railing Type 7
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S4	Overhead Signs - Truss, Single Post Type - Structural Frame Members
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ES-2F	Signal, Lighting and Electrical Systems - Service Equipment and Typical Wiring Diagram Type III-C Series
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ES-7A	Signal Standards - Push Button Posts
ES-7B	Signal and Lighting Standards - Type 1 Standards and Equipment Numbering
RSP ES-7D	Signal and Lighting Standards - Case 2 Arm Loading, Wind Velocity = 129 km/h, Arm Lengths 4.6 m to 9.1 m
RSP ES-7E	Signal and Lighting Standards - Case 3 Arm Loading, Wind Velocity = 129 km/h, Arm Lengths 4.6 m to 13.7 m
ES-7M	Signal and Lighting Standards - Details No. 1
ES-7N	Signal and Lighting Standards - Details No. 2
ES-7O	Sign Illumination - Internally Illuminated Street Name Sign
ES-8	Signal, Lighting and Electrical Systems - Pull Box Details
ES-9A	Signal, Lighting and Electrical Systems - Electrical Details, Structure Installations
ES-9B	Signal, Lighting and Electrical Systems - Electrical Details, Structure Installations
ES-9C	Signal, Lighting and Electrical Systems - Electrical Details, Structure Installations
ES-9D	Signal, Lighting and Electrical Systems - Electrical Details, Structure Installations
ES-10	Signal, Lighting and Electrical Systems - Isolux Diagrams
ES-11	Signal, Lighting and Electrical Systems - Foundation Installations
ES-13A	Signal, Lighting and Electrical Systems - Splicing Details
ES-13B	Signal, Lighting and Electrical Systems - Wiring Details and Fuse Ratings
ES-15A	Sign Illumination - Mercury Vapor Sign Illumination Equipment
ES-15C	Sign Illumination - Sign Illumination Equipment
ES-15D	Sign Illumination - Sign Illumination Control

DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

CONTRACT NO. 08-334834

08-Riv-60,91-18.9/19.2, R32.7/R34.8

Sealed proposals for the work shown on the plans entitled:

STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY IN RIVERSIDE COUNTY IN RIVERSIDE ON ROUTE 91 FROM 0.3 KM SOUTH OF MISSION INN AVENUE UNDERCROSSING TO THE 60/91/215 JUNCTION AND ON ROUTE 60 FROM MAIN STREET OVERCROSSING TO 0.2 KM EAST OF ORANGE STREET OVERCROSSING

will be received at the Department of Transportation, 3347 Michelson Drive, Suite 100, Irvine, CA 92612-1692, until 2 o'clock p.m. on September 12, 2002, at which time they will be publicly opened and read in Room C - 1116 at the same address.

Proposal forms for this work are included in a separate book entitled:

STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROPOSAL AND CONTRACT FOR CONSTRUCTION ON STATE HIGHWAY IN RIVERSIDE COUNTY IN RIVERSIDE ON ROUTE 91 FROM 0.3 KM SOUTH OF MISSION INN AVENUE UNDERCROSSING TO THE 60/91/215 JUNCTION AND ON ROUTE 60 FROM MAIN STREET OVERCROSSING TO 0.2 KM EAST OF ORANGE STREET OVERCROSSING

General work description: Widen Bridges, Construct New Bridge and Retaining Walls.

This project has a goal of 10 percent disadvantaged business enterprise (DBE) participation. No prebid meeting is scheduled for this project.

THIS PROJECT IS SUBJECT TO THE "BUY AMERICA" PROVISIONS OF THE SURFACE TRANSPORTATION ASSISTANCE ACT OF 1982 AS AMENDED BY THE INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT OF 1991.

Bids are required for the entire work described herein.

At the time this contract is awarded, the Contractor shall possess either a Class A license or a combination of Class C licenses which constitutes a majority of the work.

This contract is subject to state contract nondiscrimination and compliance requirements pursuant to Government Code, Section 12990.

Project plans, special provisions, and proposal forms for bidding this project can only be obtained at the Department of Transportation, Plans and Bid Documents, Room 0200, MS #26, Transportation Building, 1120 N Street, Sacramento, California 95814, FAX No. (916) 654-7028, Telephone No. (916) 654-4490. Use FAX orders to expedite orders for project plans, special provisions and proposal forms. FAX orders must include credit card charge number, card expiration date and authorizing signature. Project plans, special provisions, and proposal forms may be seen at the above Department of Transportation office and at the offices of the District Directors of Transportation at Irvine, Oakland, and the district in which the work is situated. Standard Specifications and Standard Plans are available through the State of California, Department of Transportation, Publications Unit, 1900 Royal Oaks Drive, Sacramento, CA 95815, Telephone No. (916) 445-3520.

Cross sections for this project are not available.

The successful bidder shall furnish a payment bond and a performance bond.

The Department of Transportation hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation.

The U.S. Department of Transportation (DOT) provides a toll-free "hotline" service to report bid rigging activities. Bid rigging activities can be reported Mondays through Fridays, between 8:00 a.m. and 5:00 p.m., eastern time, Telephone No. 1-800-424-9071. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report these activities. The "hotline" is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county, or counties, in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at the Labor Compliance Office at the offices of the District Director of Transportation for the district in which the work is situated, and available from the California Department of Industrial Relations' internet web site at: <http://www.dir.ca.gov>. The Federal minimum wage rates for this project as predetermined by the United States Secretary of Labor are available through the California Department of Transportation's Electronic Project Document Distribution Site on the internet at <http://hqidoc1.dot.ca.gov/>. Addenda to modify the Federal minimum wage rates, if necessary, will be issued to holders of "Proposal and Contract" books. Future effective general prevailing wage rates which have been predetermined and are on file with the California Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

If there is a difference between the minimum wage rates predetermined by the United States Secretary of Labor and the general prevailing wage rates determined by the Director of the California Department of Industrial Relations for similar classifications of labor, the Contractor and subcontractors shall pay not less than the higher wage rate. The Department will not accept lower State wage rates not specifically included in the Federal minimum wage determinations. This includes "helper" (or other classifications based on hours of experience) or any other classification not appearing in the Federal wage determinations. Where Federal wage determinations do not contain the State wage rate determination otherwise available for use by the Contractor and subcontractors, the Contractor and subcontractors shall pay not less than the Federal minimum wage rate which most closely approximates the duties of the employees in question.

DEPARTMENT OF TRANSPORTATION

Deputy Director Transportation Engineering

Dated July 29, 2002

MCT

COPY OF ENGINEER'S ESTIMATE
(NOT TO BE USED FOR BIDDING PURPOSES)
08-334834

Item	Item Code	Item	Unit of Measure	Estimated Quantity
1	070012	PROGRESS SCHEDULE (CRITICAL PATH METHOD)	LS	LS
2	070018	TIME-RELATED OVERHEAD	WDAY	240
3	074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM
4	074020	WATER POLLUTION CONTROL	LS	LUMP SUM
5 (S)	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM
6 (S)	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM
7 (S)	024464	FLASHING ARROW SIGN	EA	6
8 (S)	120120	TYPE III BARRICADE	EA	38
9 (S)	120151	TEMPORARY TRAFFIC STRIPE (TAPE)	M	2610
10 (S)	120152	TEMPORARY PAVEMENT MARKING (TAPE)	M2	220
11 (S)	120165	CHANNELIZER (SURFACE MOUNTED)	EA	57
12 (S)	120200	FLASHING BEACON (PORTABLE)	EA	58
13 (S)	120300	TEMPORARY PAVEMENT MARKER	EA	86
14 (S)	128650	PORTABLE CHANGEABLE MESSAGE SIGN	EA	15
15 (S)	129000	TEMPORARY RAILING (TYPE K)	M	1360
16 (S)	129100	TEMPORARY CRASH CUSHION MODULE	EA	210
17 (S)	129150	TEMPORARY TRAFFIC SCREEN	M	4360
18	129510	TEMPORARY RETAINING WALL	M2	225
19	150305	OBLITERATE SURFACING	M2	5240
20	150608	REMOVE CHAIN LINK FENCE	M	1600

Item	Item Code	Item	Unit of Measure	Estimated Quantity
21	150662	REMOVE METAL BEAM GUARD RAILING	M	30
22	150701	REMOVE YELLOW PAINTED TRAFFIC STRIPE	M	1500
23	150711	REMOVE PAINTED TRAFFIC STRIPE	M	1680
24	150714	REMOVE THERMOPLASTIC TRAFFIC STRIPE	M	80
25	150715	REMOVE THERMOPLASTIC PAVEMENT MARKING	M2	66
26	024465	REMOVE THERMOPLASTIC PAVEMENT MARKING (YELLOW)	M2	44
27	150722	REMOVE PAVEMENT MARKER	EA	640
28	150744	REMOVE ROADSIDE SIGN (WOOD POST)	EA	18
29	150760	REMOVE SIGN STRUCTURE	EA	1
30	150763	REMOVE SIGN PANEL	EA	7
31	150767	REMOVE BRIDGE MOUNTED SIGN	EA	3
32	150771	REMOVE ASPHALT CONCRETE DIKE	M	150
33	150805	REMOVE CULVERT	M	160
34	150820	REMOVE INLET	EA	8
35	150821	REMOVE HEADWALL	EA	1
36	150826	REMOVE MANHOLE	EA	1
37	150828	REMOVE JUNCTION BOX	EA	1
38	024466	REMOVE ABANDONED GAS LINE	M	60
39	024467	REMOVE ABANDONED ELECTRIC VAULT	EA	1
40	150841	REMOVE SEWER PIPE	M	80

Item	Item Code	Item	Unit of Measure	Estimated Quantity
41	150860	REMOVE BASE AND SURFACING	M3	470
42	151224	REMOVE DELINEATOR	EA	10
43	151272	SALVAGE METAL BEAM GUARD RAILING	M	1530
44	151278	SALVAGE DOUBLE METAL BEAM BARRIER	M	470
45	151540	RECONSTRUCT CHAIN LINK FENCE	M	480
46	152300	RESET OBJECT MARKER	EA	4
47	152316	RESET ROADSIDE SIGN (ONE POST)	EA	43
48	152317	RESET ROADSIDE SIGN (TWO POST)	EA	3
49	152325	RESET ROADSIDE SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	5
50	152386	RELOCATE ROADSIDE SIGN-ONE POST	EA	6
51	152387	RELOCATE ROADSIDE SIGN-TWO POST	EA	1
52	152475	ADJUST SEWER MANHOLE	EA	2
53	152604	MODIFY INLET	EA	6
54	152610	MODIFY MANHOLE	EA	1
55 (S)	153152	COLD PLANE ASPHALT CONCRETE PAVEMENT (30 MM MAXIMUM)	M2	690
56	153215	REMOVE CONCRETE (CURB AND GUTTER)	M	660
57	153218	REMOVE CONCRETE SIDEWALK	M2	310
58	153220	REMOVE CONCRETE (CHANNEL)	M3	2
59	157550	BRIDGE REMOVAL	LS	LUMP SUM
60	157561	BRIDGE REMOVAL (PORTION), LOCATION A	LS	LUMP SUM

Item	Item Code	Item	Unit of Measure	Estimated Quantity
61	157562	BRIDGE REMOVAL (PORTION), LOCATION B	LS	LUMP SUM
62	157563	BRIDGE REMOVAL (PORTION), LOCATION C	LS	LUMP SUM
63	160101	CLEARING AND GRUBBING	LS	LUMP SUM
64	190101	ROADWAY EXCAVATION	M3	9320
65 (F)	192003	STRUCTURE EXCAVATION (BRIDGE)	M3	4996
66 (F)	192037	STRUCTURE EXCAVATION (RETAINING WALL)	M3	13 516
67 (F)	192050	STRUCTURE EXCAVATION (TIEBACK WALL)	M3	170
68 (F)	192055	STRUCTURE EXCAVATION (SOIL NAIL WALL)	M3	830
69 (F)	193003	STRUCTURE BACKFILL (BRIDGE)	M3	4981
70 (F)	193013	STRUCTURE BACKFILL (RETAINING WALL)	M3	15 925
71 (F)	193026	STRUCTURE BACKFILL (TIEBACK WALL)	M3	11
72 (F)	193028	STRUCTURE BACKFILL (SOIL NAIL WALL)	M3	69
73 (F)	193030	PERVIOUS BACKFILL MATERIAL	M3	266
74 (F)	193031	PERVIOUS BACKFILL MATERIAL (RETAINING WALL)	M3	1482
75 (F)	197020	EARTH RETAINING STRUCTURE	M2	4333
76 (S)	197060	SOIL NAIL ASSEMBLY	M	3472
77	198001	IMPORTED BORROW	M3	76 600
78 (S)	200001	HIGHWAY PLANTING	LS	LUMP SUM
79 (S)	024468	ROCK BLANKET (TYPE 1)	M2	260
80 (S)	203003	STRAW (EROSION CONTROL)	TONN	8

Item	Item Code	Item	Unit of Measure	Estimated Quantity
81 (S)	203014	FIBER (EROSION CONTROL)	KG	3200
82 (S)	203045	PURE LIVE SEED (EROSION CONTROL)	KG	46
83 (S)	203056	COMMERCIAL FERTILIZER (EROSION CONTROL)	KG	600
84 (S)	203061	STABILIZING EMULSION (EROSION CONTROL)	KG	1600
85 (S)	204031	TRANSPLANT PALM TREE	EA	10
86 (S)	204098	MAINTAIN EXISTING PLANTS	LS	LUMP SUM
87 (S)	204099	PLANT ESTABLISHMENT WORK	LS	LUMP SUM
88 (S)	208000	IRRIGATION SYSTEM	LS	LUMP SUM
89 (S)	208733	300 MM CORRUGATED HIGH DENSITY POLYETHYLENE PIPE CONDUIT	M	15
90	260201	CLASS 2 AGGREGATE BASE	M3	1970
91	390155	ASPHALT CONCRETE (TYPE A)	TONN	5110
92	394040	PLACE ASPHALT CONCRETE DIKE (TYPE A)	M	120
93	397001	ASPHALTIC EMULSION (PAINT BINDER)	TONN	0.6
94	490511	FURNISH STEEL PILING (HP 250 X 85)	M	3600
95 (S)	490512	DRIVE STEEL PILE (HP 250 X 85)	EA	256
96 (S)	490657	600 MM CAST-IN-DRILLED-HOLE CONCRETE PILING	M	1551
97 (S)	500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	LUMP SUM
98 (S)	500050	TIEBACK ANCHOR	EA	70
99 (F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	M3	1049
100 (F)	510053	STRUCTURAL CONCRETE, BRIDGE	M3	3284

Item	Item Code	Item	Unit of Measure	Estimated Quantity
101 (F)	510060	STRUCTURAL CONCRETE, RETAINING WALL	M3	6149
102 (F)	510072	STRUCTURAL CONCRETE, BARRIER SLAB	M3	769
103 (F)	510086	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)	M3	477
104	510220	CLASS 3 CONCRETE (BACKFILL)	M3	4
105	510502	MINOR CONCRETE (MINOR STRUCTURE)	M3	86
106 (F)	511035	ARCHITECTURAL TREATMENT	M2	5057
107	511106	DRILL AND BOND DOWEL	M	208
108 (S)	512232	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (20 M - 25 M)	EA	6
109 (S)	512233	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (25 M - 30 M)	EA	14
110 (S)	512234	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (30 M - 35 M)	EA	18
111 (S)	512235	FURNISH PRECAST PRESTRESSED CONCRETE GIRDER (35 M - 40 M)	EA	4
112 (S)	512500	ERECT PRECAST PRESTRESSED CONCRETE GIRDER	EA	42
113 (S)	519120	JOINT SEAL (MR 15 MM)	M	124
114 (S)	519144	JOINT SEAL (MR 50 MM)	M	55
115 (S-F)	520102	BAR REINFORCING STEEL (BRIDGE)	KG	533 500
116 (S-F)	520103	BAR REINFORCING STEEL (RETAINING WALL)	KG	441 954
117 (F)	530100	SHOTCRETE	M3	184
118 (S)	560203	FURNISH SIGN STRUCTURE (BRIDGE MOUNTED WITH WALKWAY)	KG	5770
119 (S)	560204	INSTALL SIGN STRUCTURE (BRIDGE MOUNTED WITH WALKWAY)	KG	5770
120 (S)	560218	FURNISH SIGN STRUCTURE (TRUSS)	KG	5600

Item	Item Code	Item	Unit of Measure	Estimated Quantity
121 (S)	560219	INSTALL SIGN STRUCTURE (TRUSS)	KG	5600
122 (S)	561009	920 MM CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	M	7
123 (S)	566011	ROADSIDE SIGN - ONE POST	EA	7
124 (S)	568001	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	5
125 (S)	568017	INSTALL ROADSIDE SIGN PANEL ON EXISTING POST	EA	6
126 (S)	568023	INSTALL ROADSIDE SIGN (LAMINATED WOOD BOX POST)	EA	2
127	620910	450 MM ALTERNATIVE PIPE CULVERT (TYPE A)	M	50
128	620911	450 MM ALTERNATIVE PIPE CULVERT (TYPE B)	M	40
129	620913	600 MM ALTERNATIVE PIPE CULVERT	M	320
130	650069	450 MM REINFORCED CONCRETE PIPE	M	47
131	650075	600 MM REINFORCED CONCRETE PIPE	M	5
132	650077	750 MM REINFORCED CONCRETE PIPE	M	5
133	650079	900 MM REINFORCED CONCRETE PIPE	M	4
134	700657	900 MM CORRUGATED STEEL PIPE INLET (1.63 MM THICK)	M	5
135 (F)	721810	SLOPE PAVING (CONCRETE)	M3	6
136	731502	MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION)	M3	310
137 (F)	731517	MINOR CONCRETE (GUTTER)	M	666
138 (S)	750001	MISCELLANEOUS IRON AND STEEL	KG	4760
139 (S)	800391	CHAIN LINK FENCE (TYPE CL-1.8)	M	110
140 (S)	802592	2.4 M CHAIN LINK GATE (TYPE CL-1.8)	EA	6

Item	Item Code	Item	Unit of Measure	Estimated Quantity
141	820107	DELINEATOR (CLASS 1)	EA	13
142	832003	METAL BEAM GUARD RAILING (WOOD POST)	M	150
143 (S-F)	833031	CHAIN LINK RAILING (TYPE 6)	M	151
144 (S-F)	833032	CHAIN LINK RAILING (TYPE 7)	M	179
145	833080	CONCRETE BARRIER (TYPE K)	M	3240
146 (F)	833142	CONCRETE BARRIER (TYPE 26 MODIFIED)	M	169
147 (S-F)	839521	CABLE RAILING	M	1153
148 (S)	839591	CRASH CUSHION, SAND FILLED	EA	3
149 (F)	839704	CONCRETE BARRIER (TYPE 60D)	M	623
150 (F)	839713	CONCRETE BARRIER (TYPE 60SE)	M	440
151 (F)	049099	CONCRETE BARRIER (TYPE 732 MODIFIED)	M	857
152 (F)	049100	CONCRETE BARRIER (TYPE 736 MODIFIED)	M	30
153 (F)	839721	CONCRETE BARRIER (TYPE 732A)	M	481
154 (S)	840515	THERMOPLASTIC PAVEMENT MARKING	M2	410
155 (S)	840560	THERMOPLASTIC TRAFFIC STRIPE (SPRAYABLE)	M	900
156 (S)	840656	PAINT TRAFFIC STRIPE (2-COAT)	M	7910
157 (S)	850101	PAVEMENT MARKER (NON-REFLECTIVE)	EA	590
158 (S)	850111	PAVEMENT MARKER (RETROREFLECTIVE)	EA	690
159 (S)	860508	MODIFY SIGN ILLUMINATION	LS	LUMP SUM
160	861100	RAMP METERING SYSTEM	LS	LUMP SUM

Item	Item Code	Item	Unit of Measure	Estimated Quantity
161 (S)	861491	MODIFY SIGNAL (LOCATION 1)	LS	LUMP SUM
162 (S)	861492	MODIFY SIGNAL (LOCATION 2)	LS	LUMP SUM
163 (S)	861493	MODIFY SIGNAL (LOCATION 3)	LS	LUMP SUM
164 (S)	861494	MODIFY SIGNAL (LOCATION 4)	LS	LUMP SUM
165 (S)	861503	MODIFY LIGHTING	LS	LUMP SUM
166 (S)	861504	MODIFY LIGHTING AND SIGN ILLUMINATION	LS	LUMP SUM
167 (S)	024469	MODIFY COMMUNICATION HUB ASSEMBLY	LS	LUMP SUM
168 (S)	024470	MODIFY FIBER OPTIC COMMUNICATION SYSTEM	LS	LUMP SUM
169 (S)	869075	SYSTEM TESTING AND DOCUMENTATION	LS	LUMP SUM
170	999990	MOBILIZATION	LS	LUMP SUM

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISIONS

Annexed to Contract No. 08-334834

SECTION 1. SPECIFICATIONS AND PLANS

The work embraced herein shall conform to the provisions in the Standard Specifications dated July 1999, and the Standard Plans dated July 1999, of the Department of Transportation insofar as the same may apply, and these special provisions.

In case of conflict between the Standard Specifications and these special provisions, the special provisions shall take precedence over and shall be used in lieu of the conflicting portions.

**AMENDMENTS TO JULY 1999 STANDARD
SPECIFICATIONS**

UPDATED JUNE 13, 2002

Amendments to the Standard Specifications set forth in these special provisions shall be considered as part of the Standard Specifications for the purposes set forth in Section 5-1.04, "Coordination and Interpretation of Plans, Standard Specifications and Special Provisions," of the Standard Specifications. Whenever either the term "Standard Specifications is amended" or the term "Standard Specifications are amended" is used in the special provisions, the text or table following the term shall be considered an amendment to the Standard Specifications. In case of conflict between such amendments and the Standard Specifications, the amendments shall take precedence over and be used in lieu of the conflicting portions.

SECTION 2: PROPOSAL REQUIREMENTS AND CONDITIONS

Issue Date: June 6, 2002

Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications is amended to read:

2-1.03 Examination of Plans, Specifications, Contract, and Site of Work

- The bidder shall examine carefully the site of the work contemplated, the plans and specifications, and the proposal and contract forms therefor. The submission of a bid shall be conclusive evidence that the bidder has investigated and is satisfied as to the general and local conditions to be encountered, as to the character, quality and scope of work to be performed, the quantities of materials to be furnished and as to the requirements of the proposal, plans, specifications and the contract.
- The submission of a bid shall also be conclusive evidence that the bidder is satisfied that the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information was reasonably ascertainable from an inspection of the site and the records of exploratory work done by the Department as shown in the bid documents, as well as from the plans and specifications made a part of the contract.
- Where the Department has made investigations of site conditions including subsurface conditions in areas where work is to be performed under the contract, or in other areas, some of which may constitute possible local material sources, bidders or contractors may, upon written request, inspect the records of the Department as to those investigations subject to and upon the conditions hereinafter set forth.

- Where there has been prior construction by the Department or other public agencies within the project limits, records of the prior construction that are currently in the possession of the Department and which have been used by, or are known to, the designers and administrators of the project will be made available for inspection by bidders or contractors, upon written request, subject to the conditions hereinafter set forth. The records may include, but are not limited to, as-built drawings, design calculations, foundation and site studies, project reports and other data assembled in connection with the investigation, design, construction and maintenance of the prior projects.
- Inspection of the records of investigations and project records may be made at the office of the district in which the work is situated, or in the case of records of investigations related to structure work, at the Transportation Laboratory in Sacramento, California.
- When a log of test borings or other record of geotechnical data obtained by the Department's investigation of surface and subsurface conditions is included with the contract plans, it is furnished for the bidders' or Contractor's information and its use shall be subject to the conditions and limitations set forth in this Section 2-1.03.
- In some instances, information considered by the Department to be of possible interest to bidders or contractors has been compiled as "Materials Information." The use of the "Materials Information" shall be subject to the conditions and limitations set forth in this Section 2-1.03 and Section 6-2, "Local Materials."
- When cross sections are not included with the plans, but are available, bidders or contractors may inspect the cross sections and obtain copies for their use, at their expense.
- When cross sections are included with the contract plans, it is expressly understood and agreed that the cross sections do not constitute part of the contract, do not necessarily represent actual site conditions or show location, character, dimensions and details of work to be performed, and are included in the plans only for the convenience of bidders and their use is subject to the conditions and limitations set forth in this Section 2-1.03.
- When contour maps were used in the design of the project, the bidders may inspect those maps, and if available, they may obtain copies for their use.
- The availability or use of information described in this Section 2-1.03 is not to be construed in any way as a waiver of the provisions of the first paragraph in this Section 2-1.03 and bidders and contractors are cautioned to make independent investigations and examinations as they deem necessary to be satisfied as to conditions to be encountered in the performance of the work and, with respect to possible local material sources, the quality and quantity of material available from the property and the type and extent of processing that may be required in order to produce material conforming to the requirements of the specifications.
- The Department assumes no responsibility for conclusions or interpretations made by a bidder or contractor based on the information or data made available by the Department. The Department does not assume responsibility for representation made by its officers or agents before the execution of the contract concerning surface or subsurface conditions, unless that representation is expressly stated in the contract.
- No conclusions or interpretations made by a bidder or contractor from the information and data made available by the Department will relieve a bidder or contractor from properly fulfilling the terms of the contract.

SECTION 5: CONTROL OF WORK

Issue Date: December 31, 2001

Section 5-1.02A, "Trench Excavation Safety Plans," of the Standard Specifications is amended to read:

5-1.02A Excavation Safety Plans

- The Construction Safety Orders of the Division of Occupational Safety and Health shall apply to all excavations. For all excavations 1.5 m or more in depth, the Contractor shall submit to the Engineer a detailed plan showing the design and details of the protective systems to be provided for worker protection from the hazard of caving ground during excavation. The detailed plan shall include any tabulated data and any design calculations used in the preparation of the plan. Excavation shall not begin until the detailed plan has been reviewed and approved by the Engineer.
- Detailed plans of protective systems for which the Construction Safety Orders require design by a registered professional engineer shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California, and shall include the soil classification, soil properties, soil design calculations that demonstrate adequate stability of the protective system, and any other design calculations used in the preparation of the plan.
- No plan shall allow the use of a protective system less effective than that required by the Construction Safety Orders.
- If the detailed plan includes designs of protective systems developed only from the allowable configurations and slopes, or Appendices, contained in the Construction Safety Orders, the plan shall be submitted at least 5 days before the Contractor intends to begin excavation. If the detailed plan includes designs of protective systems developed from tabulated data, or designs for which design by a registered professional engineer is required, the plan shall be submitted at least 3 weeks before the Contractor intends to begin excavation.

- Attention is directed to Section 7-1.01E, "Trench Safety."

SECTION 19: EARTHWORK

Issue Date: December 31, 2001

The third paragraph of Section 19-1.02, "Preservation of Property," of the Standard Specifications is amended to read:

- In addition to the provisions in Sections 5-1.02, "Plans and Working Drawings," and 5-1.02A, "Excavation Safety Plans," detailed plans of the protective systems for excavations on or affecting railroad property will be reviewed for adequacy of protection provided for railroad facilities, property, and traffic. These plans shall be submitted at least 9 weeks before the Contractor intends to begin excavation requiring the protective systems. Approval by the Engineer of the detailed plans for the protective systems will be contingent upon the plans being satisfactory to the railroad company involved.

SECTION 42: GROOVE AND GRIND PAVEMENT

Issue Date: December 31, 2001

The last sentence of the first subparagraph of the third paragraph in Section 42-2.02, "Construction," of the Standard Specifications is amended to read:

After grinding has been completed, the pavement shall conform to the straightedge and profile requirements specified in Section 40-1.10, "Final Finishing."

SECTION 49: PILING

Issue Date: December 31, 2001

Section 49-1.05, "Driving Equipment," of the Standard Specifications is amended by adding the following paragraph after the seventh paragraph:

- The use of followers or underwater hammers for driving piles will be permitted if authorized in writing by the Engineer. When a follower or underwater hammer is used, its efficiency shall be verified by furnishing the first pile in each bent or footing sufficiently long and driving the pile without the use of a follower or underwater hammer.

The first and second paragraphs in Section 49-4.01, "Description," of the Standard Specifications are amended to read:

- Cast-in-place concrete piles shall consist of one of the following:

- A. Steel shells driven permanently to the required bearing value and penetration and filled with concrete.
- B. Steel casings installed permanently to the required penetration and filled with concrete.
- C. Drilled holes filled with concrete.
- D. Rock sockets filled with concrete.

- The drilling of holes shall conform to the provisions in these specifications. Concrete filling for cast-in-place concrete piles is designated by compressive strength and shall have a minimum 28-day compressive strength of 25 MPa. At the option of the Contractor, the combined aggregate grading for the concrete shall be either the 25-mm maximum grading, the 12.5-mm maximum grading, or the 9.5-mm maximum grading. Concrete shall conform to the provisions in Section 90, "Portland Cement Concrete," and Section 51, "Concrete Structures." Reinforcement shall conform to the provisions in Section 52, "Reinforcement."

The fourth paragraph in Section 49-4.03, "Drilled Holes," of the Standard Specifications is amended to read:

- After placing reinforcement and prior to placing concrete in the drilled hole, if caving occurs or deteriorated foundation material accumulates on the bottom of the hole, the bottom of the drilled hole shall be cleaned. The Contractor shall verify that the bottom of the drilled hole is clean.

The third paragraph in Section 49-6.02, "Payment," of the Standard Specifications is amended to read:

- The contract price paid per meter for cast-in-drilled-hole concrete piling shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in drilling holes, disposing of material resulting from drilling holes, temporarily casing holes and removing water when necessary, furnishing and placing concrete and reinforcement, and constructing reinforced concrete extensions, complete in place, to the required penetration, as shown on the plans, as specified in these specifications and in the special provisions, and as directed by the Engineer.

SECTION 50: PRESTRESSING CONCRETE

Issue Date: December 31, 2001

Section 50-1.02, "Drawings," of the Standard Specifications is amended by adding the following paragraph after the second paragraph:

- Each working drawing submittal shall consist of plans for a single bridge or portion thereof. For multi-frame bridges, each frame shall require a separate working drawing submittal.

Section 50-1.05, "Prestressing Steel," of the Standard Specifications is amended to read:

- Prestressing steel shall be high-tensile wire conforming to the requirements in ASTM Designation: A 421, including Supplement I; high-tensile seven-wire strand conforming to the requirements in ASTM Designation: A 416; or uncoated high-strength steel bars conforming to the requirements in ASTM Designation: A 722, including all supplementary requirements. The maximum mass requirement of ASTM Designation: A 722 will not apply.

- In addition to the requirements of ASTM Designation: A 722, for deformed bars, the reduction of area shall be determined from a bar from which the deformations have been removed. The bar shall be machined no more than necessary to remove the deformations over a length of 300 mm, and reduction will be based on the area of the machined portion.

- In addition to the requirements specified herein, epoxy-coated seven-wire prestressing steel strand shall be grit impregnated and filled in conformance with the requirements in ASTM Designation: A 882/A 882M, including Supplement I, and the following:

- A. The coating material shall be on the Department's list of approved coating materials for epoxy-coated strand, available from the Transportation Laboratory.
- B. The film thickness of the coating after curing shall be 381 μm to 1143 μm .
- C. Prior to coating the strand, the Contractor shall furnish to the Transportation Laboratory a representative 230-g sample from each batch of epoxy coating material to be used. Each sample shall be packaged in an airtight container identified with the manufacturer's name and batch number.
- D. Prior to use of the epoxy-coated strand in the work, written certifications referenced in ASTM Designation: A 882/A 882M, including a representative load-elongation curve for each size and grade of strand to be used and a copy of the quality control tests performed by the manufacturer, shall be furnished to the Engineer.
- E. In addition to the requirements in Section 50-1.10, "Samples for Testing," four 1.5-m long samples of coated strand and one 1.5-m long sample of uncoated strand of each size and reel shall be furnished to the Engineer for testing. These samples, as selected by the Engineer, shall be representative of the material to be used in the work.
- F. Epoxy-coated strand shall be cut using an abrasive saw.
- G. All visible damage to coatings caused by shipping and handling, or during installation, including cut ends, shall be repaired in conformance with the requirements in ASTM Designation: A 882/A 882M. The patching material shall be furnished by the manufacturer of the epoxy powder and shall be applied in conformance with the manufacturer's written recommendations. The patching material shall be compatible with the original epoxy coating material and shall be inert in concrete.

- All bars in any individual member shall be of the same grade, unless otherwise permitted by the Engineer.
- When bars are to be extended by the use of couplers, the assembled units shall have a tensile strength of not less than the manufacturer's minimum guaranteed ultimate tensile strength of the bars. Failure of any one sample to meet this requirement will be cause for rejection of the heat of bars and lot of couplers. The location of couplers in the member shall be subject to approval by the Engineer.

- Wires shall be straightened if necessary to produce equal stress in all wires or wire groups or parallel lay cables that are to be stressed simultaneously or when necessary to ensure proper positioning in the ducts.

- Where wires are to be button-headed, the buttons shall be cold formed symmetrically about the axes of the wires. The buttons shall develop the minimum guaranteed ultimate tensile strength of the wire. No cold forming process shall be used that causes indentations in the wire. Buttonheads shall not contain wide open splits, more than 2 splits per head, or splits not parallel with the axis of the wire.
- Prestressing steel shall be protected against physical damage and rust or other results of corrosion at all times from manufacture to grouting or encasing in concrete. Prestressing steel that has sustained physical damage at any time shall be rejected. The development of visible rust or other results of corrosion shall be cause for rejection, when ordered by the Engineer.
- Epoxy-coated prestressing steel strand shall be covered with an opaque polyethylene sheeting or other suitable protective material to protect the strand from exposure to sunlight, salt spray, and weather. For stacked coils, the protective covering shall be draped around the perimeter of the stack. The covering shall be adequately secured; however, it should allow for air circulation around the strand to prevent condensation under the covering. Epoxy-coated strand shall not be stored within 300 m of ocean or tidal water for more than 2 months.
- Prestressing steel shall be packaged in containers or shipping forms for the protection of the steel against physical damage and corrosion during shipping and storage. Except for epoxy-coated strand, a corrosion inhibitor which prevents rust or other results of corrosion, shall be placed in the package or form, or shall be incorporated in a corrosion inhibitor carrier type packaging material, or when permitted by the Engineer, may be applied directly to the steel. The corrosion inhibitor shall have no deleterious effect on the steel or concrete or bond strength of steel to concrete. Packaging or forms damaged from any cause shall be immediately replaced or restored to original condition.
- The shipping package or form shall be clearly marked with a statement that the package contains high-strength prestressing steel, and the type of corrosion inhibitor used, including the date packaged.
- Prestressing steel for post-tensioning which is installed in members prior to placing and curing of the concrete, and which is not epoxy-coated, shall be continuously protected against rust or other results of corrosion, until grouted, by means of a corrosion inhibitor placed in the ducts or applied to the steel in the duct. The corrosion inhibitor shall conform to the provisions specified herein.
- When steam curing is used, prestressing steel for post-tensioning shall not be installed until the steam curing is completed.
- Water used for flushing ducts shall contain either quick lime (calcium oxide) or slaked lime (calcium hydroxide) in the amount of 0.01-kg/L. Compressed air used to blow out ducts shall be oil free.
- When prestressing steel for post-tensioning is installed in the ducts after completion of concrete curing, and if stressing and grouting are completed within 10 days after the installation of the prestressing steel, rust which may form during those 10 days will not be cause for rejection of the steel. Prestressing steel installed, tensioned, and grouted in this manner, all within 10 days, will not require the use of a corrosion inhibitor in the duct following installation of the prestressing steel. Prestressing steel installed as above but not grouted within 10 days shall be subject to all the requirements in this section pertaining to corrosion protection and rejection because of rust. The requirements in this section pertaining to tensioning and grouting within 10 days shall not apply to epoxy-coated prestressing steel strand.
- Any time prestressing steel for pretensioning is placed in the stressing bed and is exposed to the elements for more than 36 hours prior to encasement in concrete, adequate measures shall be taken by the Contractor, as approved by the Engineer, to protect the steel from contamination or corrosion.
- After final fabrication of the seven-wire prestressing steel strand, no electric welding of any form shall be performed on the prestressing steel. Whenever electric welding is performed on or near members containing prestressing steel, the welding ground shall be attached directly to the steel being welded.
- Pretensioned prestressing steel shall be cut off flush with the end of the member. For epoxy-coated prestressing steel, only abrasive saws shall be used to cut the steel. The exposed ends of the prestressing steel and a 25-mm strip of adjoining concrete shall be cleaned and painted. Cleaning shall be by wire brushing or abrasive blast cleaning to remove all dirt and residue on the metal or concrete surfaces. Immediately after cleaning, the surfaces shall be covered with one application of unthinned zinc-rich primer (organic vehicle type) conforming to the provisions in Section 91, "Paint," except that 2 applications shall be applied to surfaces which will not be covered by concrete or mortar. Aerosol cans shall not be used. The paint shall be thoroughly mixed at the time of application and shall be worked into any voids in the prestressing tendons.

The thirteenth paragraph in Section 50-1.08, "Prestressing," of the Standard Specifications is amended to read:

- Prestressing steel in pretensioned members shall not be cut or released until the concrete in the member has attained a compressive strength of not less than the value shown on the plans or 28 MPa, whichever is greater. In addition to these concrete strength requirements, when epoxy-coated prestressing steel strand is used, the steel shall not be cut or released until the temperature of the concrete surrounding the strand is less than 65°C, and falling.

The fifth paragraph in Section 50-1.10, "Samples for Testing," of the Standard Specifications is amended to read:

- The following samples of materials and tendons, selected by the Engineer from the prestressing steel at the plant or jobsite, shall be furnished by the Contractor to the Engineer well in advance of anticipated use:
For wire or bars, one 2-m long sample and for strand, one 1.5-m long sample, of each size shall be furnished for each heat or reel.
For epoxy-coated strand, one 1.5-m long sample of uncoated strand of each size shall be furnished for each reel.
If the prestressing tendon is a bar, one 2-m long sample shall be furnished and in addition, if couplers are to be used with the bar, two 1.25-m long samples of bar, equipped with one coupler and fabricated to fit the coupler, shall be furnished.

The second paragraph in Section 50-1.11, "Payment," of the Standard Specifications is amended to read:

- The contract lump sum prices paid for prestressing cast-in-place concrete of the types listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing, placing, and tensioning the prestressing steel in cast-in-place concrete structures, complete in place, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

SECTION 51: CONCRETE STRUCTURES

Issue Date: December 31, 2001

The first and second paragraph in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications are amended to read:

- The Contractor shall submit to the Engineer working drawings and design calculations for falsework proposed for use at bridges. For bridges where the height of any portion of the falsework, as measured from the ground line to the soffit of the superstructure, exceeds 4.25 m; or where any individual falsework clear span length exceeds 4.85 m; or where provision for vehicular, pedestrian, or railroad traffic through the falsework is made; the drawings shall be signed by an engineer who is registered as a Civil Engineer in the State of California. Six sets of the working drawings and 2 copies of the design calculations shall be furnished. Additional working drawings and design calculations shall be submitted to the Engineer when specified in "Railroad Relations and Insurance" of the special provisions.
- The falsework drawings shall include details of the falsework erection and removal operations showing the methods and sequences of erection and removal and the equipment to be used. The details of the falsework erection and removal operations shall demonstrate the stability of all or any portions of the falsework during all stages of the erection and removal operations.

The seventh paragraph in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications is amended to read:

- In the event that several falsework plans are submitted simultaneously, or an additional plan is submitted for review before the review of a previously submitted plan has been completed, the Contractor shall designate the sequence in which the plans are to be reviewed. In such event, the time to be provided for the review of any plan in the sequence shall be not less than the review time specified above for that plan, plus 2 weeks for each plan of higher priority which is still under review. A falsework plan submittal shall consist of plans for a single bridge or portion thereof. For multi-frame bridges, each frame shall require a separate falsework plan submittal.

Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications is amended by adding the following paragraphs:

- If structural composite lumber is proposed for use, the falsework drawings shall clearly identify the structural composite lumber members by grade (E value), species, and type. The Contractor shall provide technical data from the manufacturer showing the tabulated working stress values of the composite lumber. The Contractor shall furnish a certificate of compliance as specified in Section 6-1.07, "Certificates of Compliance," for each delivery of structural composite lumber to the project site.
- For falsework piles with a calculated loading capacity greater than 900 kN, the falsework piles shall be designed by an engineer who is registered as either a Civil Engineer or a Geotechnical Engineer in the State of California, and the calculations shall be submitted to the Engineer.

The first paragraph in Section 51-1.06A(1), "Design Loads," of the Standard Specifications is amended to read:

- The design load for falsework shall consist of the sum of dead and live vertical loads, and an assumed horizontal load. The minimum total design load for any falsework, including members that support walkways, shall be not less than 4800 N/m² for the combined live and dead load regardless of slab thickness.

The eighth paragraph in Section 51-1.06A(1), "Design Loads," of the Standard Specifications is amended to read:

- In addition to the minimum requirements specified in this Section 51-1.06A, falsework for box girder structures with internal falsework bracing systems using flexible members capable of withstanding tensile forces only, shall be designed to include the vertical effects caused by the elongation of the flexible member and the design horizontal load combined with the dead and live loads imposed by concrete placement for the girder stems and connected bottom slabs. Falsework comprised of individual steel towers with bracing systems using flexible members capable of withstanding tensile forces only to resist overturning, shall be exempt from these additional requirements.

The third paragraph in Section 51-1.06B, "Falsework Construction," of the Standard Specifications is amended to read:

- When falsework is supported on piles, the piles shall be driven and the actual bearing value assessed in conformance with the provisions in Section 49, "Piling."

Section 51-1.06B, "Falsework Construction," of the Standard Specifications is amended by adding the following paragraphs:

- For falsework piles with a calculated loading capacity greater than 900 kN, the Contractor shall conduct dynamic monitoring of pile driving and conduct penetration and bearing analyses based on a wave equation analysis. These analyses shall be signed by an engineer who is registered as a Civil Engineer in the State of California and submitted to the Engineer prior to completion of falsework erection.
- Prior to the placement of falsework members above the stringers, the final bracing system for the falsework shall be installed.

Section 51-1.06C, "Removing Falsework," of the Standard Specifications is amended by adding the following paragraph:

- The falsework removal operation shall be conducted in such a manner that any portion of the falsework not yet removed remains in a stable condition at all times.

The sixth paragraph in Section 51-1.09, "Placing Concrete," of the Standard Specifications is amended to read:

- Vibrators used to consolidate concrete containing epoxy-coated bar reinforcement or epoxy-coated prestressing steel shall have a resilient covering to prevent damage to the epoxy-coating on the reinforcement or prestressing steel.

The table in the ninth paragraph of Section 51-1.12H(1), "Plain and Fabric Reinforced Elastomeric Bearing Pads," of the Standard Specifications is amended to read:

Tensile strength, percent	-15
Elongation at break, percent	-40; but not less than 300% total elongation of the material
Hardness, points	+10

Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications is amended by deleting the thirteenth and fourteenth paragraphs.

The fourteenth paragraph in Section 51-1.23, "Payment," of the Standard Specifications is amended by deleting "and injecting epoxy in cracks".

SECTION 52: REINFORCEMENT

Issue Date: December 31, 2001

The third paragraph in Section 52-1.04, "Inspection," of the Standard Specifications is amended to read:

- A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall also be furnished for each shipment of epoxy-coated bar reinforcement or wire reinforcement certifying that the coated reinforcement conforms to the requirements in ASTM Designation: A 775/A 775M or A 884/A 884M, respectively, and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement." The Certificate of Compliance shall include all of the certifications specified in ASTM Designation: A 775/A 775M or A 884/A 884M respectively, and a statement that the coating material has been prequalified by acceptance testing performed by the Valley Forge Laboratories, Inc., Devon, Pennsylvania.

The third paragraph in Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications is amended to read:

- The total slip of the reinforcing bars within the splice sleeve after loading in tension to 200 MPa and relaxing to 20 MPa shall not exceed the values listed in the following table. The slip shall be measured between gage points that are clear of the splice sleeve.

Reinforcing Bar Number	Total Slip (μm)
13	250
16	250
19	250
22	350
25	350
29	350
32	450
36	450
43	600
57	750

The first paragraph in Section 52-1.08C(5), "Sleeve-Lockshear Bolt Mechanical Butt Splices," of the Standard Specifications is amended to read:

- The sleeve-lockshear bolt type of mechanical butt splices shall consist of a seamless steel sleeve, center hole with centering pin, and bolts that are tightened until the bolt heads shear off with the bolt ends left embedded in the reinforcing bars. The seamless steel sleeve shall be either formed into a V configuration or shall have 2 serrated steel strips welded to the inside of the sleeve.

Section 52-1.08F, "Nondestructive Splice Tests," of the Standard Specifications is amended by deleting the seventh paragraph.

SECTION 55: STEEL STRUCTURES

Issue Date: December 31, 2001

Section 55-3.14, "Bolted Connections," of the Standard Specifications is amended by adding the following after the ninth paragraph:

- If a torque multiplier is used in conjunction with a calibrated wrench as a method for tightening fastener assemblies to the required tension, both the multiplier and the wrench shall be calibrated together as a system. The same length input and output sockets and extensions that will be used in the work shall also be included in the calibration of the system. The manufacturer's torque multiplication ratio shall be adjusted during calibration of the system, such that when this adjusted ratio is multiplied by the actual input calibrated wrench reading, the product is a calculated output torque that is within 2 percent of the true output torque. When this system is used in the work to perform any installation tension testing, rotational capacity testing, fastener tightening, or tension verification, it shall be used, intact as calibrated.

The sixth paragraph of Section 55-4.02, "Payment," of the Standard Specifications is amended to read:

- If a portion or all of the structural steel is fabricated more than 480 air line kilometers from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impracticable and extremely difficult to ascertain and determine the actual increase in these expenses, it is agreed that payment to the Contractor for furnishing the structural steel from each fabrication site located more than 480 air line kilometers from both Sacramento and Los Angeles will be reduced \$5000 or by an amount computed at \$0.044 per kilogram of structural steel fabricated, whichever is greater, or in the case of each fabrication site located more than 4800 air line kilometers from both Sacramento and Los Angeles, payment will be reduced \$8000 or by \$0.079 per kilogram of structural steel fabricated, whichever is greater.

SECTION 56: SIGNS

Issue Date: December 31, 2001

Section 56-1.01, "Description," of the Standard Specifications is amended by deleting the third paragraph.

The sixth through the thirteenth paragraphs in Section 56-1.03, "Fabrication," of the Standard Specifications are amended to read:

- High-strength bolted connections, where shown on the plans, shall conform to the provisions in Section 55-3.14, "Bolted Connections," except that only fastener assemblies consisting of a high-strength bolt, nut, hardened washer, and direct tension indicator shall be used.
- High-strength fastener assemblies, and any other bolts, nuts, and washers attached to sign structures shall be zinc-coated by the mechanical deposition process.
- An alternating snugging and tensioning pattern for anchor bolts and high-strength bolted splices shall be used. Once tensioned, high-strength fastener components and direct tension indicators shall not be reused.
- For bolt diameters less than 10 mm, the diameter of the bolt hole shall be not more than 0.80-mm larger than the nominal bolt diameter. For bolt diameters greater than or equal to 10 mm, the diameter of the bolt hole shall be not more than 1.6 mm larger than the nominal bolt diameter.
- Sign structures shall be fabricated into the largest practical sections prior to galvanizing.
- Ribbed sheet metal panels for box beam closed truss sign structures shall be fastened to the truss members by cap screws or bolts as shown on the plans, or by 4.76 mm stainless steel blind rivets conforming to Industrial Fasteners Institute, Standard IFI-114, Grade 51. The outside diameter of the large flange rivet head shall be not less than 15.88 mm in diameter. Web splices in ribbed sheet metal panels may be made with similar type blind rivets of a size suitable for the thickness of material being connected.
- Spalling or chipping of concrete structures shall be repaired by the Contractor at the Contractor's expense.
- Overhead sign supports shall have an aluminum identification plate permanently attached near the base, adjacent to the traffic side on one of the vertical posts, using either stainless steel rivets or stainless steel screws. As a minimum, the information on the plate shall include the name of the manufacturer, the date of manufacture and the contract number.

SECTION 59: PAINTING

Issue Date: December 31, 2001

Section 59-2.01, "General," of the Standard Specifications is amended by adding the following paragraphs after the first paragraph:

- Unless otherwise specified, no painting Contractors or subcontractors will be permitted to commence work without having the following current "SSPC: The Society for Protective Coatings" (formerly the Steel Structures Painting Council) certifications in good standing:
 - A. For cleaning and painting structural steel in the field, certification in conformance with the requirements in Qualification Procedure No. 1, "Standard Procedure For Evaluating Painting Contractors (Field Application to Complex Industrial Structures)" (SSPC-QP 1).
 - B. For removing paint from structural steel, certification in conformance with the requirements in Qualification Procedure No. 2, "Standard Procedure For Evaluating Painting Contractors (Field Removal of Hazardous Coatings from Complex Structures)" (SSPC-QP 2).

- C. For cleaning and painting structural steel in a permanent painting facility, certification in conformance with the requirements in Qualification Procedure No. 3, "Standard Procedure For Evaluating Qualifications of Shop Painting Applicators" (SSPC-QP 3). The AISC's Sophisticated Paint Endorsement (SPE) quality program will be considered equivalent to SSPC-QP 3.

The third paragraph of Section 59-2.03, "Blast Cleaning," of the Standard Specifications is amended to read:

- Exposed steel or other metal surfaces to be blast cleaned shall be cleaned in conformance with the requirements in Surface Preparation Specification No. 6, "Commercial Blast Cleaning," of the "SSPC: The Society for Protective Coatings." Blast cleaning shall leave all surfaces with a dense, uniform, angular anchor pattern of not less than 35 μm as measured in conformance with the requirements in ASTM Designation: D 4417.

The first paragraph of Section 59-2.06, "Hand Cleaning," of the Standard Specifications is amended to read:

- Dirt, loose rust and mill scale, or paint which is not firmly bonded to the surfaces shall be removed in conformance with the requirements in Surface Preparation Specification No. 2, "Hand Tool Cleaning," of the "SSPC: The Society for Protective Coatings." Edges of old remaining paint shall be feathered.

The fourth paragraph of Section 59-2.12, "Painting," of the Standard Specifications is amended to read:

- The dry film thickness of the paint will be measured in place with a calibrated Type 2 magnetic film thickness gage in conformance with the requirements of specification SSPC-PA2 of the "SSPC: The Society for Protective Coatings."

SECTION 75: MISCELLANEOUS METAL

Issue Date: December 31, 2001

The table in the tenth paragraph of Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications is amended to read:

Material	Specification
Steel bars, plates and shapes	ASTM Designation: A 36/A 36M or A 575, A 576 (AISI or M Grades 1016 through 1030 except Grade 1017)
Steel fastener components for general applications:	
Bolts and studs	ASTM Designation: A 307
Headed anchor bolts	ASTM Designation: A 307, Grade B, including S1 supplementary requirements
Nonheaded anchor bolts	ASTM Designation: A 307, Grade C, including S1 supplementary requirements and S1.6 of AASHTO Designation: M 314 supplementary requirements or AASHTO Designation: M 314, Grade 36 or 55, including S1 supplementary requirements
High-strength bolts and studs, threaded rods, and nonheaded anchor bolts	ASTM Designation: A 449, Type 1
Nuts	ASTM Designation: A 563, including Appendix X1*
Washers	ASTM Designation: F 844
Components of high-strength steel fastener assemblies for use in structural steel joints:	
Bolts	ASTM Designation: A 325, Type 1
Tension control bolts	ASTM Designation: F 1852, Type 1
Nuts	ASTM Designation: A 563, including Appendix X1*
Hardened washers	ASTM Designation: F 436, Type 1, Circular, including S1 supplementary requirements
Direct tension indicators	ASTM Designation: F 959, Type 325, zinc-coated
Stainless steel fasteners (Alloys 304 & 316) for general applications:	
Bolts, screws, studs, threaded rods, and nonheaded anchor bolts	ASTM Designation: F 593 or F 738M
Nuts	ASTM Designation: F 594 or F 836M
Washers	ASTM Designation: A 240/A 240M and ANSI B 18.22M
Carbon-steel castings	ASTM Designation: A 27/A 27M, Grade 65-35 [450-240], Class 1
Malleable iron castings	ASTM Designation: A 47, Grade 32510 or A 47M, Grade 22010
Gray iron castings	ASTM Designation: A 48, Class 30B
Ductile iron castings	ASTM Designation: A 536, Grade 65-45-12
Cast iron pipe	Commercial quality
Steel pipe	Commercial quality, welded or extruded
Other parts for general applications	Commercial quality

* Zinc-coated nuts that will be tightened beyond snug or wrench tight shall be furnished with a dyed dry lubricant conforming to Supplementary Requirement S2 in ASTM Designation: A 563.

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The table in the eighteenth paragraph of Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications is amended to read:

Stud Diameter (millimeters)	Sustained Tension Test Load (kilonewtons)
29.01-33.00	137.9
23.01-29.00	79.6
21.01-23.00	64.1
* 18.01-21.00	22.2
15.01-18.00	18.2
12.01-15.00	14.2
9.01-12.00	9.34
6.00-9.00	4.23

* Maximum stud diameter permitted for mechanical expansion anchors.

The table in the nineteenth paragraph of Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications is amended to read:

Stud Diameter (millimeters)	Ultimate Tensile Load (kilonewtons)
30.01-33.00	112.1
27.01-30.00	88.1
23.01-27.00	71.2
20.01-23.00	51.6
16.01-20.00	32.0
14.01-16.00	29.4
12.00-14.00	18.7

The table in the twenty-second paragraph of Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications is amended to read:

Installation Torque Values, (newton meters)			
Stud Diameter (millimeters)	Shell Type Mechanical Expansion Anchors	Integral Stud Type Mechanical Expansion Anchors	Resin Capsule Anchors and Cast-in-Place Inserts
29.01-33.00	—	—	540
23.01-29.00	—	—	315
21.01-23.00	—	—	235
18.01-21.00	110	235	200
15.01-18.00	45	120	100
12.01-15.00	30	65	40
9.01-12.00	15	35	24
6.00-9.00	5	10	—

SECTION 83: RAILINGS AND BARRIERS

Issue Date: June 13, 2002

The ninth paragraph in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications is amended to read:

- The grades and species of wood posts and blocks shall be No. 1 timbers (also known as No. 1 structural) Douglas fir or No. 1 timbers Southern yellow pine. Wood posts and blocks shall be graded in conformance with the provisions in Section 57-2, "Structural Timber," of the Standard Specifications, except allowances for shrinkage after mill cutting shall in no case exceed 5 percent of the American Lumber Standards minimum sizes, at the time of installation.

The eleventh paragraph in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications is amended to read:

- Wood posts and blocks shall be pressure treated after fabrication in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," of the Standard Specifications with creosote, creosote coal tar solution, creosote petroleum solution (50-50), pentachlorophenol in hydrocarbon solvent, copper naphthenate, ammoniacal copper arsenate, or ammoniacal copper zinc arsenate. In addition to the preservatives listed above, Southern yellow pine may also be pressure treated with chromated copper arsenate. When other than one of the creosote processes is used, blocks shall have a minimum retention of 6.4 Kg/m³, and need not be incised.

SECTION 86: SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

Issue Date: February 28, 2002

The seventh paragraph of Section 86-2.03, "Foundations," of the Standard Specifications is amended to read:

- Forms shall be true to line and grade. Tops of foundations for posts and standards, except special foundations, shall be finished to curb or sidewalk grade or as directed by the Engineer. Forms shall be rigid and securely braced in place. Conduit ends and anchor bolts shall be placed in proper position and to proper height, and anchor bolts shall be held in place by means of rigid templates. Anchor bolts shall not be installed more than 1:40 from vertical.

The twelfth paragraph of Section 86-2.03, "Foundations," of the Standard Specifications is amended to read:

- Plumbing of the standards shall be accomplished by adjusting the leveling nuts before placing the mortar or before the foundation is finished to final grade. Shims, or other similar devices shall not be used for plumbing or raking of posts, standards or pedestals. After final adjustments of both top nuts and leveling nuts on anchorage assemblies have been made, firm contact shall exist between all bearing surfaces of the anchor bolt nuts, washers, and the base plate.

Section 86-8.01, "Payment," of the Standard Specifications is amended to read by adding the following paragraph after the first paragraph:

- If a portion or all of the traffic signal and lighting standards, pursuant to Standard Specification Section 86, "Signals, Lighting and Electrical Systems," are fabricated more than 480 air line kilometers from both-Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impracticable and extremely difficult to ascertain and determine the actual increase in such expenses, it is agreed that payment to the Contractor for furnishing such items from each fabrication site located more than 480 air line kilometers from both Sacramento and Los Angeles will be reduced \$5000; in addition, in the case where a fabrication site is located more than 4800 air line kilometers from both Sacramento and Los Angeles, payment will be reduced an additional \$3000 per each fabrication site (\$8000 total per site).

SECTION 88: ENGINEERING FABRIC

Issue Date: January 15, 2002

Section 88-1.02, "Pavement Reinforcing Fabric," of the Standard Specifications is amended to read:

- Pavement reinforcing fabric shall be 100 percent polypropylene staple fiber fabric material, needle-punched, thermally bonded on one side, and conform to the following:

Specification	Requirement
Weight, grams per square meter ASTM Designation: D 5261	140
Grab tensile strength (25-mm grip), kilonewtons, min. in each direction ASTM Designation: D 4632	0.45
Elongation at break, percent min. ASTM Designation: D 4632	50
Asphalt retention by fabric, grams per square meter. (Residual Minimum) ASTM Designation: D 6140	900

Note: Weight, grab, elongation and asphalt retention are based on Minimum Average Roll Value (MARV)

SECTION 90: PORTLAND CEMENT CONCRETE

Issue Date: March 12, 2002

Section 90, "Portland Cement Concrete," of the Standard Specifications is amended to read:

SECTION 90: PORTLAND CEMENT CONCRETE

90-1 GENERAL

90-1.01 DESCRIPTION

- Portland cement concrete shall be composed of cementitious material, fine aggregate, coarse aggregate, admixtures if used, and water, proportioned and mixed as specified in these specifications.
- The Contractor shall determine the mix proportions for all concrete except pavement concrete. The Engineer will determine the mix proportions for pavement concrete. Concrete for which the mix proportions are determined either by the Contractor or the Engineer shall conform to the requirements of this Section 90.
- Unless otherwise specified, cementitious material shall be a combination of cement and mineral admixture. Cementitious material shall be either:

- "Type IP (MS) Modified" cement; or
- A combination of "Type II Modified" portland cement and mineral admixture; or
- A combination of Type V portland cement and mineral admixture.

- Type III portland cement shall be used only as allowed in the special provisions or with the approval of the Engineer.
- Class 1 concrete shall contain not less than 400 kg of cementitious material per cubic meter.
- Class 2 concrete shall contain not less than 350 kg of cementitious material per cubic meter.
- Class 3 concrete shall contain not less than 300 kg of cementitious material per cubic meter.
- Class 4 concrete shall contain not less than 250 kg of cementitious material per cubic meter.
- Minor concrete shall contain not less than 325 kg of cementitious material per cubic meter unless otherwise specified in these specifications or the special provisions.

- Unless otherwise designated on the plans or specified in these specifications or the special provisions, the amount of cementitious material used per cubic meter of concrete in structures or portions of structures shall conform to the following:

Use	Cementitious Material Content (kg/m ³)
Concrete designated by compressive strength:	
Deck slabs and slab spans of bridges	400 min., 475 max.
Roof sections of exposed top box culverts	400 min., 475 max.
Other portions of structures	350 min., 475 max.
Concrete not designated by compressive strength:	
Deck slabs and slab spans of bridges	400 min.
Roof sections of exposed top box culverts	400 min.
Prestressed members	400 min.
Seal courses	400 min.
Other portions of structures	350 min.
Concrete for precast members	350 min., 550 max.

- Whenever the 28-day compressive strength shown on the plans is greater than 25 MPa, the concrete shall be designated by compressive strength. If the plans show a 28-day compressive strength that is 28 MPa or greater, an additional 14 days will be allowed to obtain the specified strength. The 28-day compressive strengths shown on the plans that are 25 MPa or less are shown for design information only and are not a requirement for acceptance of the concrete.
- Concrete designated by compressive strength shall be proportioned such that the concrete will attain the strength shown on the plans or specified in the special provisions.
- Before using concrete for which the mix proportions have been determined by the Contractor, or in advance of revising those mix proportions, the Contractor shall submit in writing to the Engineer a copy of the mix design.
- Compliance with cementitious material content requirements will be verified in conformance with procedures described in California Test 518 for cement content. For testing purposes, mineral admixture shall be considered to be cement. Batch proportions shall be adjusted as necessary to produce concrete having the specified cementitious material content.
- If any concrete has a cementitious material, portland cement, or mineral admixture content that is less than the minimum required, the concrete shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place and the Contractor shall pay to the State \$0.55 for each kilogram of cementitious material, portland cement, or mineral admixture that is less than the minimum required. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract. The deductions will not be made unless the difference between the contents required and those actually provided exceeds the batching tolerances permitted by Section 90-5, "Proportioning." No deductions will be made based on the results of California Test 518.
- The requirements of the preceding paragraph shall not apply to minor concrete or commercial quality concrete.

90-2 MATERIALS

90-2.01 CEMENT

- Unless otherwise specified, cement shall be either "Type IP (MS) Modified" cement, "Type II Modified" portland cement or Type V portland cement.
- "Type IP (MS) Modified" cement shall conform to the requirements for Type IP (MS) cement in ASTM Designation: C 595, and shall be comprised of an intimate and uniform blend of Type II cement and not more than 35 percent by mass of mineral admixture. The type and minimum amount of mineral admixture used in the manufacture of "Type IP (MS) Modified" cement shall be in conformance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures."
- "Type II Modified" portland cement shall conform to the requirements for Type II portland cement in ASTM Designation: C 150.
- In addition, "Type IP (MS) Modified" cement and "Type II Modified" portland cement shall conform to the following requirements:
 - A. The cement shall not contain more than 0.60 percent by mass of alkalis, calculated as the percentage of Na₂O plus 0.658 times the percentage of K₂O, when determined by either direct intensity flame photometry or by the atomic absorption method. The instrument and procedure used shall be qualified as to precision and accuracy in conformance with the requirements in ASTM Designation: C 114;
 - B. The autoclave expansion shall not exceed 0.50 percent; and

- C. Mortar, containing the cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not expand in water more than 0.010 percent and shall not contract in air more than 0.048 percent, except that when cement is to be used for precast prestressed concrete piling, precast prestressed concrete members, or steam cured concrete products, the mortar shall not contract in air more than 0.053 percent.

- Type III and Type V portland cements shall conform to the requirements in ASTM Designation: C 150 and the additional requirements listed above for "Type II Modified" portland cement, except that when tested in conformance with California Test 527, mortar containing Type III portland cement shall not contract in air more than 0.075 percent.

- Cement used in the manufacture of cast-in-place concrete for exposed surfaces of like elements of a structure shall be from the same cement mill.

- Cement shall be protected from exposure to moisture until used. Sacked cement shall be piled to permit access for tally, inspection, and identification of each shipment.

- Adequate facilities shall be provided to assure that cement meeting the provisions specified in this Section 90-2.01 shall be kept separate from other cement in order to prevent any but the specified cement from entering the work. Safe and suitable facilities for sampling cement shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper, in conformance with California Test 125.

- If cement is used prior to sampling and testing as provided in Section 6-1.07, "Certificates of Compliance," and the cement is delivered directly to the site of the work, the Certificate of Compliance shall be signed by the cement manufacturer or supplier of the cement. If the cement is used in ready-mixed concrete or in precast concrete products purchased as such by the Contractor, the Certificate of Compliance shall be signed by the manufacturer of the concrete or product.

- Cement furnished without a Certificate of Compliance shall not be used in the work until the Engineer has had sufficient time to make appropriate tests and has approved the cement for use.

90-2.02 AGGREGATES

- Aggregates shall be free from deleterious coatings, clay balls, roots, bark, sticks, rags, and other extraneous material.

- Natural aggregates shall be thoroughly and uniformly washed before use.

- The Contractor, at the Contractor's expense, shall provide safe and suitable facilities, including necessary splitting devices for obtaining samples of aggregates, in conformance with California Test 125.

- Aggregates shall be of such character that it will be possible to produce workable concrete within the limits of water content provided in Section 90-6.06, "Amount of Water and Penetration."

- Aggregates shall have not more than 10 percent loss when tested for soundness in conformance with the requirements in California Test 214. The soundness requirement for fine aggregate will be waived, provided that the durability index, D_f , of the fine aggregate is 60, or greater, when tested for durability in conformance with California Test 229.

- If the results of any one or more of the Cleanness Value, Sand Equivalent, or aggregate grading tests do not meet the requirements specified for "Operating Range" but all meet the "Contract Compliance" requirements, the placement of concrete shall be suspended at the completion of the current pour until tests or other information indicate that the next material to be used in the work will comply with the requirements specified for "Operating Range."

- If the results of either or both the Cleanness Value and coarse aggregate grading tests do not meet the requirements specified for "Contract Compliance," the concrete that is represented by the tests shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place, and the Contractor shall pay to the State \$4.60 per cubic meter for paving concrete and \$7.20 per cubic meter for all other concrete for the concrete represented by these tests and left in place. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract.

- If the results of either or both the Sand Equivalent and fine aggregate grading tests do not meet the requirements specified for "Contract Compliance," the concrete which is represented by the tests shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place, and the Contractor shall pay to the State \$4.60 per cubic meter for paving concrete and \$7.20 per cubic meter for all other concrete for the concrete represented by these tests and left in place. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract.

- The 2 preceding paragraphs apply individually to the "Contract Compliance" requirements for coarse aggregate and fine aggregate. When both coarse aggregate and fine aggregate do not conform to the "Contract Compliance" requirements, both paragraphs shall apply. The payments specified in those paragraphs shall be in addition to any payments made in conformance with the provisions in Section 90-1.01, "Description."

- No single Cleanness Value, Sand Equivalent or aggregate grading test shall represent more than 250 m³ of concrete or one day's pour, whichever is smaller.

- Aggregates specified for freeze-thaw resistance shall pass the freezing and thawing test, California Test 528.

- The Contractor shall notify the Engineer of the proposed source of freeze-thaw resistant concrete aggregates at least 4 months before intended use. Should the Contractor later propose a different source of concrete aggregates, the Contractor shall again notify the Engineer at least 4 months before intended use. Blending of fine or coarse aggregates from untested sources with acceptable aggregates will not be permitted. Provisions for the time of submission of samples as provided in Section 40-1.015, "Cement Content," are superseded by the foregoing.

- Concurrently with notification of proposed sources of freeze-thaw resistant concrete aggregates, the Contractor shall furnish samples in the quantity ordered by the Engineer. The samples shall be secured under the direct supervision of the Engineer. Samples from existing stockpiles of processed aggregate shall be taken from washed materials and shall be visibly damp. Samples from materials in place in a material source shall be taken at depths from the existing surface that will ensure the presence of the full quantity of ground water. Excavations for the purpose of securing samples shall be made to the full depth of intended source operations. Samples shall be protected against loss of contained water until they are delivered to the Engineer.

- The Engineer will waive the above freeze-thaw test and the 4-month advance notice, required in this Section, provided aggregates are to be obtained from sources that have previously passed this test and test results are currently applicable.

- No extension of contract time will be allowed for the time required to perform the freezing and thawing test.

- When the source of an aggregate is changed, except for pavement concrete, the Contractor shall adjust the mix proportions and submit in writing to the Engineer a copy of the mix design before using the aggregates. When the source of an aggregate is changed for pavement concrete, the Engineer shall be allowed sufficient time to adjust the mix, and the aggregates shall not be used until necessary adjustments are made.

90-2.02A Coarse Aggregate

- Coarse aggregate shall consist of gravel, crushed gravel, crushed rock, crushed air-cooled iron blast furnace slag or combinations thereof. Crushed air-cooled blast furnace slag shall not be used in reinforced or prestressed concrete.

- Coarse aggregate shall conform to the following quality requirements:

Tests	California Test	Requirements
Loss in Los Angeles Rattler (after 500 revolutions)	211	45% max.
Cleanness Value		
Operating Range	227	75 min.
Contract Compliance	227	71 min.

- In lieu of the above Cleanness Value requirements, a Cleanness Value "Operating Range" limit of 71, minimum, and a Cleanness Value "Contract Compliance" limit of 68, minimum, will be used to determine the acceptability of the coarse aggregate if the Contractor furnishes a Certificate of Compliance, as provided in Section 6-1.07, "Certificates of Compliance," certifying that:

1. coarse aggregate sampled at the completion of processing at the aggregate production plant had a Cleanness Value of not less than 82 when tested by California Test 227; and
2. prequalification tests performed in conformance with the requirements in California Test 549 indicated that the aggregate would develop a relative strength of not less than 95 percent and would have a relative shrinkage not greater than 105 percent, based on concrete.

90-2.02B Fine Aggregate

- Fine aggregate shall consist of natural sand, manufactured sand produced from larger aggregate or a combination thereof. Manufactured sand shall be well graded.
- Fine aggregate shall conform to the following quality requirements:

Test	California Test	Requirements
Organic Impurities	213	Satisfactory ^a
Mortar Strengths Relative to Ottawa Sand	515	95%, min.
Sand Equivalent:		
Operating Range	217	75, min.
Contract Compliance	217	71, min.

a Fine aggregate developing a color darker than the reference standard color solution may be accepted if it is determined by the Engineer, from mortar strength tests, that a darker color is acceptable.

- In lieu of the above Sand Equivalent requirements, a Sand Equivalent "Operating Range" limit of 71 minimum and a Sand Equivalent "Contract Compliance" limit of 68 minimum will be used to determine the acceptability of the fine aggregate if the Contractor furnishes a Certificate of Compliance, as provided in Section 6-1.07, "Certificates of Compliance," certifying that:

1. fine aggregate sampled at the completion of processing at the aggregate production plant had a Sand Equivalent value of not less than 82 when tested by California Test 217; and
2. prequalification tests performed in conformance with California Test 549 indicated that the aggregate would develop a relative strength of not less than 95 percent and would have a relative shrinkage not greater than 105 percent, based on concrete.

90-2.03 WATER

- In conventionally reinforced concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 1000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, nor more than 1300 parts per million of sulfates as SO₄, when tested in conformance with California Test 417. In prestressed concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 650 parts per million of chlorides as Cl, when tested in conformance with California Test 422, nor more than 1300 parts per million of sulfates as SO₄, when tested in conformance with California Test 417. In no case shall the water contain an amount of impurities that will cause either: 1) a change in the setting time of cement of more than 25 percent when tested in conformance with the requirements in ASTM Designation: C 191 or ASTM Designation: C 266 or 2) a reduction in the compressive strength of mortar at 14 days of more than 5 percent, when tested in conformance with the requirements in ASTM Designation: C 109, when compared to the results obtained with distilled water or deionized water, tested in conformance with the requirements in ASTM Designation: C 109.

- In non-reinforced concrete work, the water for curing, for washing aggregates and for mixing shall be free from oil and shall not contain more than 2000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, or more than 1500 parts per million of sulfates as SO₄, when tested in conformance with California Test 417.

- In addition to the above provisions, water for curing concrete shall not contain impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.

- Water reclaimed from mixer wash-out operations may be used in mixing concrete. The water shall not contain coloring agents or more than 300 parts per million of alkalis (Na₂O + 0.658 K₂O) as determined on the filtrate. The specific gravity of the water shall not exceed 1.03 and shall not vary more than ±0.010 during a day's operations.

90-2.04 ADMIXTURE MATERIALS

- Admixture materials shall conform to the requirements in the following ASTM Designations:

- A. Chemical Admixtures—ASTM Designation: C 494.
- B. Air-entraining Admixtures—ASTM Designation: C 260.
- C. Calcium Chloride—ASTM Designation: D 98.
- D. Mineral Admixtures—Coal fly ash; raw or calcined natural pozzolan as specified in ASTM Designation: C618; silica fume conforming to the requirements in ASTM Designation: C1240, with reduction of mortar expansion of 80 percent, minimum, using the cement from the proposed mix design.

- Unless otherwise specified in the special provisions, mineral admixtures shall be used in conformance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures."

90-3 AGGREGATE GRADINGS

90-3.01 GENERAL

- Before beginning concrete work, the Contractor shall submit in writing to the Engineer the gradation of the primary aggregate nominal sizes that the Contractor proposes to furnish. If a primary coarse aggregate or the fine aggregate is separated into 2 or more sizes, the proposed gradation shall consist of the gradation for each individual size, and the proposed proportions of each individual size, combined mathematically to indicate one proposed gradation. The proposed gradation shall meet the grading requirements shown in the table in this section, and shall show the percentage passing each of the sieve sizes used in determining the end result.
- The Engineer may waive, in writing, the gradation requirements in this Section 90-3.01 and in Sections 90-3.02, "Coarse Aggregate Grading," 90-3.03, "Fine Aggregate Grading," and 90-3.04, "Combined Aggregate Gradings," if, in the Engineer's opinion, furnishing the gradation is not necessary for the type or amount of concrete work to be constructed.
- Gradations proposed by the Contractor shall be within the following percentage passing limits:

Primary Aggregate Nominal Size	Sieve Size	Limits of Proposed Gradation
37.5-mm x 19-mm	25-mm	19 - 41
25-mm x 4.75-mm	19-mm	52 - 85
25-mm x 4.75-mm	9.5-mm	15 - 38
12.5-mm x 4.75-mm	9.5-mm	40 - 78
9.5-mm x 2.36-mm	9.5-mm	50 - 85
Fine Aggregate	1.18-mm	55 - 75
Fine Aggregate	600-μm	34 - 46
Fine Aggregate	300-μm	16 - 29

- Should the Contractor change the source of supply, the Contractor shall submit in writing to the Engineer the new gradations before their intended use.

90-3.02 COARSE AGGREGATE GRADING

- The grading requirements for coarse aggregates are shown in the following table for each size of coarse aggregate:

Sieve Sizes	Percentage Passing Primary Aggregate Nominal Sizes							
	37.5-mm x 19-mm		25-mm x 4.75-mm		12.5-mm x 4.75-mm		9.5-mm x 2.36-mm	
	Operating Range	Contract Compliance	Operating Range	Contract Compliance	Operating Range	Contract Compliance	Operating Range	Contract Compliance
50-mm	100	100	—	—	—	—	—	—
37.5-mm	88-100	85-100	100	100	—	—	—	—
25-mm	x ± 18	X ± 25	88-100	86-100	—	—	—	—
19-mm	0-17	0-20	X ± 15	X ± 22	100	100	—	—
12.5-mm	—	—	—	—	82-100	80-100	100	100
9.5-mm	0-7	0-9	X ± 15	X ± 22	X ± 15	X ± 22	X ± 15	X ± 20
4.75-mm	—	—	0-16	0-18	0-15	0-18	0-25	0-28
2.36-mm	—	—	0-6	0-7	0-6	0-7	0-6	0-7

- In the above table, the symbol X is the gradation that the Contractor proposes to furnish for the specific sieve size as provided in Section 90-3.01, "General."
- Coarse aggregate for the 37.5-mm, maximum, combined aggregate grading as provided in Section 90-3.04, "Combined Aggregate Gradings," shall be furnished in 2 or more primary aggregate nominal sizes. Each primary aggregate nominal size may be separated into 2 sizes and stored separately, provided that the combined material conforms to the grading requirements for that particular primary aggregate nominal size.

- When the 25-mm, maximum, combined aggregate grading as provided in Section 90-3.04, "Combined Aggregate Gradings," is to be used, the coarse aggregate may be separated into 2 sizes and stored separately, provided that the combined material shall conform to the grading requirements for the 25-mm x 4.75-mm primary aggregate nominal size.

90-3.03 FINE AGGREGATE GRADING

- Fine aggregate shall be graded within the following limits:

Sieve Sizes	Percentage Passing	
	Operating Range	Contract Compliance
9.5-mm	100	100
4.75-mm	95-100	93-100
2.36-mm	65-95	61-99
1.18-mm	X ± 10	X ± 13
600-μm	X ± 9	X ± 12
300-μm	X ± 6	X ± 9
150-μm	2-12	1-15
75-μm	0-8	0-10

- In the above table, the symbol X is the gradation that the Contractor proposes to furnish for the specific sieve size as provided in Section 90-3.01, "General."
- In addition to the above required grading analysis, the distribution of the fine aggregate sizes shall be such that the difference between the total percentage passing the 1.18-mm sieve and the total percentage passing the 600-μm sieve shall be between 10 and 40, and the difference between the percentage passing the 600-μm and 300-μm sieves shall be between 10 and 40.
- Fine aggregate may be separated into 2 or more sizes and stored separately, provided that the combined material conforms to the grading requirements specified in this Section 90-3.03.

90-3.04 COMBINED AGGREGATE GRADINGS

- Combined aggregate grading limits shall be used only for the design of concrete mixes. Concrete mixes shall be designed so that aggregates are combined in proportions that shall produce a mixture within the grading limits for combined aggregates as specified herein. Within these limitations, the relative proportions shall be as ordered by the Engineer, except as otherwise provided in Section 90-1.01, "Description."
- The combined aggregate grading used in portland cement concrete pavement shall be the 37.5-mm, maximum grading.
- The combined aggregate grading used in concrete for structures and other concrete items, except when specified otherwise in these specifications or the special provisions, shall be either the 37.5-mm, maximum grading, or the 25-mm, maximum grading, at the option of the Contractor.

Grading Limits of Combined Aggregates

Sieve Sizes	Percentage Passing			
	37.5-mm Max.	25-mm Max.	12.5-mm Max.	9.5-mm Max.
50-mm	100	—	—	—
37.5-mm	90-100	100	—	—
25-mm	50-86	90-100	—	—
19-mm	45-75	55-100	100	—
12.5-mm	—	—	90-100	100
9.5-mm	38-55	45-75	55-86	50 - 100
4.75-mm	30-45	35-60	45-63	45 - 63
2.36-mm	23-38	27-45	35-49	35 - 49
1.18-mm	17-33	20-35	25-37	25 - 37
600-μm	10-22	12-25	15-25	15 - 25
300-μm	4-10	5-15	5-15	5 - 15
150-μm	1-6	1-8	1-8	1 - 8
75-μm	0-3	0-4	0-4	0 - 4

- Changes from one grading to another shall not be made during the progress of the work unless permitted by the Engineer.

90-4 ADMIXTURES

90-4.01 GENERAL

- Admixtures used in portland cement concrete shall conform to and be used in conformance with the provisions in this Section 90-4 and the special provisions. Admixtures shall be used when specified or ordered by the Engineer and may be used at the Contractor's option as provided herein.
- Chemical admixtures and air-entraining admixtures containing chlorides as Cl in excess of one percent by mass of admixture, as determined by California Test 415, shall not be used in prestressed or reinforced concrete.
- Calcium chloride shall not be used in concrete containing steel reinforcement or other embedded metals.
- Mineral admixture used in concrete for exposed surfaces of like elements of a structure shall be from the same source and of the same percentage.
- Admixtures shall be uniform in properties throughout their use in the work. Should it be found that an admixture as furnished is not uniform in properties, its use shall be discontinued.
- If more than one admixture is used, the admixtures shall be compatible with each other so that the desirable effects of all admixtures used will be realized.

90-4.02 MATERIALS

- Admixture materials shall conform to the provisions in Section 90-2.04, "Admixture Materials."

90-4.03 ADMIXTURE APPROVAL

- No admixture brand shall be used in the work unless it is on the Department's current list of approved brands for the type of admixture involved.
- Admixture brands will be considered for addition to the approved list if the manufacturer of the admixture submits to the Transportation Laboratory a sample of the admixture accompanied by certified test results demonstrating that the admixture complies with the requirements in the appropriate ASTM Designation and these specifications. The sample shall be sufficient to permit performance of all required tests. Approval of admixture brands will be dependent upon a determination as to compliance with the requirements, based on the certified test results submitted, together with tests the Department may elect to perform.
- When the Contractor proposes to use an admixture of a brand and type on the current list of approved admixture brands, the Contractor shall furnish a Certificate of Compliance from the manufacturer, as provided in Section 6-1.07, "Certificates of Compliance," certifying that the admixture furnished is the same as that previously approved. If a previously approved admixture is not accompanied by a Certificate of Compliance, the admixture shall not be used in the work until the Engineer has had sufficient time to make the appropriate tests and has approved the admixture for use. The Engineer may take samples for testing at any time, whether or not the admixture has been accompanied by a Certificate of Compliance.
- If a mineral admixture is delivered directly to the site of the work, the Certificate of Compliance shall be signed by the manufacturer or supplier of the mineral admixture. If the mineral admixture is used in ready-mix concrete or in precast concrete products purchased as such by the Contractor, the Certificate of Compliance shall be signed by the manufacturer of the concrete or product.

90-4.04 REQUIRED USE OF CHEMICAL ADMIXTURES AND CALCIUM CHLORIDE

- When the use of a chemical admixture or calcium chloride is specified or ordered by the Engineer, the admixture shall be used at the dosage specified or ordered, except that if no dosage is specified or ordered, the admixture shall be used at the dosage normally recommended by the manufacturer of the admixture.
- Calcium chloride shall be dispensed in liquid, flake, or pellet form. Calcium chloride dispensed in liquid form shall conform to the provisions for dispensing liquid admixtures in Section 90-4.10, "Proportioning and Dispensing Liquid Admixtures."

90-4.05 OPTIONAL USE OF CHEMICAL ADMIXTURES

- The Contractor will be permitted to use Type A or F, water-reducing; Type B, retarding; or Type D or G, water-reducing and retarding admixtures as described in ASTM Designation: C 494 to conserve cementitious material or to facilitate any concrete construction application subject to the following conditions:
 - A. When a water-reducing admixture or a water-reducing and retarding admixture is used, the cementitious material content specified or ordered may be reduced by a maximum of 5 percent by mass, except that the resultant cementitious material content shall be not less than 300 kilograms per cubic meter; and
 - B. When a reduction in cementitious material content is made, the dosage of admixture used shall be the dosage used in determining approval of the admixture.

- Unless otherwise specified, a Type C accelerating chemical admixture conforming to the requirements in ASTM Designation: C 494, may be used in portland cement concrete. Inclusion in the mix design submitted for approval will not be required provided that the admixture is added to counteract changing conditions that contribute to delayed setting of the portland cement concrete, and the use or change in dosage of the admixture is approved in writing by the Engineer.

90-4.06 REQUIRED USE OF AIR-ENTRAINING ADMIXTURES

- When air-entrainment is specified or ordered by the Engineer, the air-entraining admixture shall be used in amounts to produce a concrete having the specified air content as determined by California Test 504.

90-4.07 OPTIONAL USE OF AIR-ENTRAINING ADMIXTURES

- When air-entrainment has not been specified or ordered by the Engineer, the Contractor will be permitted to use an air-entraining admixture to facilitate the use of any construction procedure or equipment provided that the average air content, as determined by California Test 504, of 3 successive tests does not exceed 4 percent, and no single test value exceeds 5.5 percent. If the Contractor elects to use an air-entraining admixture in concrete for pavement, the Contractor shall so indicate at the time the Contractor designates the source of aggregate as provided in Section 40-1.015, "Cement Content."

90-4.08 REQUIRED USE OF MINERAL ADMIXTURES

- Unless otherwise specified, mineral admixture shall be combined with cement to make cementitious material.
- The calcium oxide content of mineral admixtures shall not exceed 10 percent and the available alkali, as sodium oxide equivalent, shall not exceed 1.5 percent when determined in conformance with the requirements in ASTM Designation: C 618.
- The amounts of cement and mineral admixture used in cementitious material shall be sufficient to satisfy the minimum cementitious material content requirements specified in Section 90-1.01, "Description," or Section 90-4.05, "Optional Use of Chemical Admixtures," and shall conform to the following:

- A. The minimum amount of cement shall not be less than 75 percent by mass of the specified minimum cementitious material content;
- B. The minimum amount of mineral admixture to be combined with cement shall be determined using one of the following criteria:
 1. When the calcium oxide content of a mineral admixture is equal to or less than 2 percent by mass, the amount of mineral admixture shall not be less than 15 percent by mass of the total amount of cementitious material to be used in the mix;
 2. When the calcium oxide content of a mineral admixture is greater than 2 percent, the amount of mineral admixture shall not be less than 25 percent by mass of the total amount of cementitious material to be used in the mix;
 3. When a mineral admixture that conforms to the provisions for silica fume in Section 90-2.04, "Admixture Materials," is used, the amount of mineral admixture shall not be less than 10 percent by mass of the total amount of cementitious material to be used in the mix
- C. The total amount of mineral admixture shall not exceed 35 percent by mass of the total amount of cementitious material to be used in the mix. Where Section 90-1.01, "Description," specifies a maximum cementitious content in kilograms per cubic meter, the total mass of cement and mineral admixture per cubic meter shall not exceed the specified maximum cementitious material content.

90-4.09 BLANK

90-4.10 PROPORTIONING AND DISPENSING LIQUID ADMIXTURES

- Chemical admixtures and air-entraining admixtures shall be dispensed in liquid form. Dispensers for liquid admixtures shall have sufficient capacity to measure at one time the prescribed quantity required for each batch of concrete. Each dispenser shall include a graduated measuring unit into which liquid admixtures are measured to within ± 5 percent of the prescribed quantity for each batch. Dispensers shall be located and maintained so that the graduations can be accurately read from the point at which proportioning operations are controlled to permit a visual check of batching accuracy prior to discharge. Each measuring unit shall be clearly marked for the type and quantity of admixture.

- Each liquid admixture dispensing system shall be equipped with a sampling device consisting of a valve located in a safe and readily accessible position such that a sample of the admixture may be withdrawn slowly by the Engineer.

- If more than one liquid admixture is used in the concrete mix, each liquid admixture shall have a separate measuring unit and shall be dispensed by injecting equipment located in such a manner that the admixtures are not mixed at high concentrations and do not interfere with the effectiveness of each other. When air-entraining admixtures are used in conjunction with other liquid admixtures, the air-entraining admixture shall be the first to be incorporated into the mix.
- When automatic proportioning devices are required for concrete pavement, dispensers for liquid admixtures shall operate automatically with the batching control equipment. The dispensers shall be equipped with an automatic warning system in good operating condition that will provide a visible or audible signal at the point at which proportioning operations are controlled when the quantity of admixture measured for each batch of concrete varies from the preselected dosage by more than 5 percent, or when the entire contents of the measuring unit are not emptied from the dispenser into each batch of concrete.
- Unless liquid admixtures are added to premeasured water for the batch, their discharge into the batch shall be arranged to flow into the stream of water so that the admixtures are well dispersed throughout the batch, except that air-entraining admixtures may be dispensed directly into moist sand in the batching bins provided that adequate control of the air content of the concrete can be maintained.
- Liquid admixtures requiring dosages greater than 2.5 L/m³ shall be considered to be water when determining the total amount of free water as specified in Section 90-6.06, "Amount of Water and Penetration."
- Special admixtures, such as "high range" water reducers that may contribute to a high rate of slump loss, shall be measured and dispensed as recommended by the admixture manufacturer and as approved by the Engineer.

90-4.11 STORAGE, PROPORTIONING, AND DISPENSING OF MINERAL ADMIXTURES

- Mineral admixtures shall be protected from exposure to moisture until used. Sacked material shall be piled to permit access for tally, inspection and identification for each shipment.
- Adequate facilities shall be provided to assure that mineral admixtures meeting the specified requirements are kept separate from other mineral admixtures in order to prevent any but the specified mineral admixtures from entering the work. Safe and suitable facilities for sampling mineral admixtures shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper.
- Mineral admixtures shall be incorporated into concrete using equipment conforming to the requirements for cement weigh hoppers, and charging and discharging mechanisms in ASTM Designation: C 94, in Section 90-5.03, "Proportioning," and in this Section 90-4.11.
- When concrete is completely mixed in stationary paving mixers, the mineral admixture shall be weighed in a separate weigh hopper conforming to the provisions for cement weigh hoppers and charging and discharging mechanisms in Section 90-5.03A, "Proportioning for Pavement," and the mineral admixture and cement shall be introduced simultaneously into the mixer proportionately with the aggregate. If the mineral admixture is not weighed in a separate weigh hopper, the Contractor shall provide certification that the stationary mixer is capable of mixing the cement, admixture, aggregates and water uniformly prior to discharge. Certification shall contain the following:

- A. Test results for 2 compressive strength test cylinders of concrete taken within the first one-third and 2 compressive strength test cylinders of concrete taken within the last one-third of the concrete discharged from a single batch from the stationary paving mixer. Strength tests and cylinder preparation will be in conformance with the provisions of Section 90-9, "Compressive Strength;"
- B. Calculations demonstrating that the difference in the averages of 2 compressive strengths taken in the first one-third is no greater than 7.5 percent different than the averages of 2 compressive strengths taken in the last one-third of the concrete discharged from a single batch from the stationary paving mixer. Strength tests and cylinder preparation will be in conformance with the provisions of Section 90-9, "Compressive Strength;" and
- C. The mixer rotation speed and time of mixing prior to discharge that are required to produce a mix that meets the requirements above.

90-5 PROPORTIONING

90-5.01 STORAGE OF AGGREGATES

- Aggregates shall be stored or stockpiled in such a manner that separation of coarse and fine particles of each size shall be avoided and also that the various sizes shall not become intermixed before proportioning.
 - Aggregates shall be stored or stockpiled and handled in a manner that shall prevent contamination by foreign materials. In addition, storage of aggregates at batching or mixing facilities that are erected subsequent to the award of the contract and that furnish concrete to the project shall conform to the following:
- A. Intermingling of the different sizes of aggregates shall be positively prevented. The Contractor shall take the necessary measures to prevent intermingling. The preventive measures may include, but are not necessarily limited to, physical separation of stockpiles or construction of bulkheads of adequate length and height; and

- B. Contamination of aggregates by contact with the ground shall be positively prevented. The Contractor shall take the necessary measures to prevent contamination. The preventive measures shall include, but are not necessarily limited to, placing aggregates on wooden platforms or on hardened surfaces consisting of portland cement concrete, asphalt concrete, or cement treated material.

- In placing aggregates in storage or in moving the aggregates from storage to the weigh hopper of the batching plant, any method that may cause segregation, degradation, or the combining of materials of different gradings that will result in any size of aggregate at the weigh hopper failing to meet the grading requirements, shall be discontinued. Any method of handling aggregates that results in excessive breakage of particles shall be discontinued. The use of suitable devices to reduce impact of falling aggregates may be required by the Engineer.

90-5.02 PROPORTIONING DEVICES

- Weighing, measuring, or metering devices used for proportioning materials shall conform to the requirements in Section 9-1.01, "Measurement of Quantities," and this Section 90-5.02. In addition, automatic weighing systems shall comply with the requirements for automatic proportioning devices in Section 90-5.03A, "Proportioning for Pavement." Automatic devices shall be automatic to the extent that the only manual operation required for proportioning the aggregates, cement, and mineral admixture for one batch of concrete is a single operation of a switch or starter.

- Proportioning devices shall be tested at the expense of the Contractor as frequently as the Engineer may deem necessary to ensure their accuracy.

- Weighing equipment shall be insulated against vibration or movement of other operating equipment in the plant. When the plant is in operation, the mass of each batch of material shall not vary from the mass designated by the Engineer by more than the tolerances specified herein.

- Equipment for cumulative weighing of aggregate shall have a zero tolerance of ± 0.5 percent of the designated total batch mass of the aggregate. For systems with individual weigh hoppers for the various sizes of aggregate, the zero tolerance shall be ± 0.5 percent of the individual batch mass designated for each size of aggregate. Equipment for cumulative weighing of cement and mineral admixtures shall have a zero tolerance of ± 0.5 percent of the designated total batch mass of the cement and mineral admixture. Equipment for weighing cement or mineral admixture separately shall have a zero tolerance of ± 0.5 percent of their designated individual batch masses. Equipment for measuring water shall have a zero tolerance of ± 0.5 percent of its designated mass or volume.

- The mass indicated for any batch of material shall not vary from the preselected scale setting by more than the following:

- A. Aggregate weighed cumulatively shall be within 1.0 percent of the designated total batch mass of the aggregate. Aggregates weighed individually shall be within 1.5 percent of their respective designated batch masses; and
- B. Cement shall be within 1.0 percent of its designated batch mass. When weighed individually, mineral admixture shall be within 1.0 percent of its designated batch mass. When mineral admixture and cement are permitted to be weighed cumulatively, cement shall be weighed first to within 1.0 percent of its designated batch mass, and the total for cement and mineral admixture shall be within 1.0 percent of the sum of their designated batch masses; and
- C. Water shall be within 1.5 percent of its designated mass or volume.

- Each scale graduation shall be approximately 0.001 of the total capacity of the scale. The capacity of scales for weighing cement, mineral admixture, or cement plus mineral admixture and aggregates shall not exceed that of commercially available scales having single graduations indicating a mass not exceeding the maximum permissible mass variation above, except that no scale shall be required having a capacity of less than 500 kg, with 0.5-kg graduations.

90-5.03 PROPORTIONING

- Proportioning shall consist of dividing the aggregates into the specified sizes, each stored in a separate bin, and combining them with cement, mineral admixture, and water as provided in these specifications. Aggregates shall be proportioned by mass.

- At the time of batching, aggregates shall have been dried or drained sufficiently to result in a stable moisture content such that no visible separation of water from aggregate will take place during transportation from the proportioning plant to the point of mixing. In no event shall the free moisture content of the fine aggregate at the time of batching exceed 8 percent of its saturated, surface-dry mass.

- Should separate supplies of aggregate material of the same size group, but of different moisture content or specific gravity or surface characteristics affecting workability, be available at the proportioning plant, withdrawals shall be made from one supply exclusively and the materials therein completely exhausted before starting upon another.

- Bulk "Type IP (MS) Modified" cement shall be weighed in an individual hopper and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer.

- Bulk cement and mineral admixture may be weighed in separate, individual weigh hoppers or may be weighed in the same weigh hopper and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer. If the cement and mineral admixture are weighed cumulatively, the cement shall be weighed first.

- When cement and mineral admixtures are weighed in separate weigh hoppers, the weigh systems for the proportioning of the aggregate, the cement, and the mineral admixture shall be individual and distinct from all other weigh systems. Each weigh system shall be equipped with a hopper, a lever system, and an indicator to constitute an individual and independent material weighing device. The cement and the mineral admixture shall be discharged into the mixer simultaneously with the aggregate.

- The scales and weigh hoppers for bulk weighing cement, mineral admixture, or cement plus mineral admixture shall be separate and distinct from the aggregate weighing equipment.

- For batches with a volume of one cubic meter or more, the batching equipment shall conform to one of the following combinations:

- A. Separate boxes and separate scale and indicator for weighing each size of aggregate.

- B. Single box and scale indicator for all aggregates.

- C. Single box or separate boxes and automatic weighing mechanism for all aggregates.

- In order to check the accuracy of batch masses, the gross mass and tare mass of batch trucks, truck mixers, truck agitators, and non-agitating hauling equipment shall be determined when ordered by the Engineer. The equipment shall be weighed at the Contractor's expense on scales designated by the Engineer.

90-5.03A Proportioning for Pavement

- Aggregates and bulk cement, mineral admixture, and cement plus mineral admixture for use in pavement shall be proportioned by mass by means of automatic proportioning devices of approved type conforming to these specifications.

- The Contractor shall install and maintain in operating condition an electronically actuated moisture meter that will indicate, on a readily visible scale, changes in the moisture content of the fine aggregate as it is batched within a sensitivity of 0.5 percent by mass of the fine aggregate.

- The batching of cement, mineral admixture, or cement plus mineral admixture and aggregate shall be interlocked so that a new batch cannot be started until all weigh hoppers are empty, the proportioning devices are within zero tolerance, and the discharge gates are closed. The interlock shall permit no part of the batch to be discharged until all aggregate hoppers and the cement and mineral admixture hoppers or the cement plus mineral admixture hopper are charged with masses that are within the tolerances specified in Section 90-5.02, "Proportioning Devices."

- When interlocks are required for cement and mineral admixture charging mechanisms and cement and mineral admixtures are weighed cumulatively, their charging mechanisms shall be interlocked to prevent the introduction of mineral admixture until the mass of cement in the cement weigh hopper is within the tolerances specified in Section 90-5.02, "Proportioning Devices."

- The discharge gate on the cement and mineral admixture hoppers or the cement plus mineral admixture hopper shall be designed to permit regulating the flow of cement, mineral admixture, or cement plus mineral admixture into the aggregate as directed by the Engineer.

- When separate weigh boxes are used for each size of aggregate, the discharge gates shall permit regulating the flow of each size of aggregate as directed by the Engineer.

- Material discharged from the several bins shall be controlled by gates or by mechanical conveyors. The means of withdrawal from the several bins, and of discharge from the weigh box, shall be interlocked so that not more than one bin can discharge at a time, and so that the weigh box cannot be tripped until the required quantity from each of the several bins has been deposited therein. Should a separate weigh box be used for each size of aggregate, all may be operated and discharged simultaneously.

- When the discharge from the several bins is controlled by gates, each gate shall be actuated automatically so that the required mass is discharged into the weigh box, after which the gate shall automatically close and lock.

- The automatic weighing system shall be designed so that all proportions required may be set on the weighing controller at the same time.

90-6 MIXING AND TRANSPORTING

90-6.01 GENERAL

- Concrete shall be mixed in mechanically operated mixers, except that when permitted by the Engineer, batches not exceeding 0.25 m³ may be mixed by hand methods in conformance with the provisions in Section 90-6.05, "Hand-Mixing."

- Equipment having components made of aluminum or magnesium alloys that would have contact with plastic concrete during mixing, transporting, or pumping of portland cement concrete shall not be used.

- Concrete shall be homogeneous and thoroughly mixed, and there shall be no lumps or evidence of undispersed cement, mineral admixture, or cement plus mineral admixture.
- Uniformity of concrete mixtures will be determined by differences in penetration as determined by California Test 533, or slump as determined by ASTM Designation: C 143, and by variations in the proportion of coarse aggregate as determined by California Test 529.
- When the mix design specifies a penetration value, the difference in penetration, determined by comparing penetration tests on 2 samples of mixed concrete from the same batch or truck mixer load, shall not exceed 10 mm. When the mix design specifies a slump value, the difference in slump, determined by comparing slump tests on 2 samples of mixed concrete from the same batch or truck mixer load, shall not exceed the values given in the table below. Variation in the proportion of coarse aggregate will be determined by comparing the results of tests of 2 samples of mixed concrete from the same batch or truck mixer load and the difference between the 2 results shall not exceed 100 kg per cubic meter of concrete.

Average Slump	Maximum Permissible Difference
Less than 100-mm	25-mm
100-mm to 150-mm	38-mm
Greater than 150-mm to 225-mm	50-mm

- The Contractor, at the Contractor's expense, shall furnish samples of the freshly mixed concrete and provide satisfactory facilities for obtaining the samples.

90-6.02 MACHINE MIXING

- Concrete mixers may be of the revolving drum or the revolving blade type, and the mixing drum or blades shall be operated uniformly at the mixing speed recommended by the manufacturer. Mixers and agitators that have an accumulation of hard concrete or mortar shall not be used.
- The temperature of mixed concrete, immediately before placing, shall be not less than 10°C or more than 32°C. Aggregates and water shall be heated or cooled as necessary to produce concrete within these temperature limits. Neither aggregates nor mixing water shall be heated to exceed 65°C. If ice is used to cool the concrete, discharge of the mixer will not be permitted until all ice is melted.
- The batch shall be so charged into the mixer that some water will enter in advance of cementitious materials and aggregates. All water shall be in the drum by the end of the first one - fourth of the specified mixing time.
- Cementitious materials shall be batched and charged into the mixer by means that will not result either in loss of cementitious materials due to the effect of wind, in accumulation of cementitious materials on surfaces of conveyors or hoppers, or in other conditions that reduce or vary the required quantity of cementitious material in the concrete mixture.
- Paving and stationary mixers shall be operated with an automatic timing device. The timing device and discharge mechanism shall be interlocked so that during normal operation no part of the batch will be discharged until the specified mixing time has elapsed.
- The total elapsed time between the intermingling of damp aggregates and all cementitious materials and the start of mixing shall not exceed 30 minutes.
- The size of batch shall not exceed the manufacturer's guaranteed capacity.
- When producing concrete for pavement or base, suitable batch counters shall be installed and maintained in good operating condition at jobsite batching plants and stationary mixers. The batch counters shall indicate the exact number of batches proportioned and mixed.
- Concrete shall be mixed and delivered to the jobsite by means of one of the following combinations of operations:
 - A. Mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in truck agitators or in non-agitating hauling equipment (central-mixed concrete).
 - B. Mixed partially in a stationary mixer, and the mixing completed in a truck mixer (shrink-mixed concrete).
 - C. Mixed completely in a truck mixer (transit-mixed concrete).
 - D. Mixed completely in a paving mixer.
- Agitators may be truck mixers operating at agitating speed or truck agitators. Each mixer and agitator shall have attached thereto in a prominent place a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the manufacturer's guaranteed capacity of the drum or container in terms of the volume of mixed concrete and the speed of rotation of the mixing drum or blades.
- Truck mixers shall be equipped with electrically or mechanically actuated revolution counters by which the number of revolutions of the drum or blades may readily be verified.
- When shrink-mixed concrete is furnished, concrete that has been partially mixed at a central plant shall be transferred to a truck mixer and all requirements for transit-mixed concrete shall apply. No credit in the number of revolutions at mixing speed shall be allowed for partial mixing in a central plant.

90-6.03 TRANSPORTING MIXED CONCRETE

- Mixed concrete may be transported to the delivery point in truck agitators or truck mixers operating at the speed designated by the manufacturer of the equipment as agitating speed, or in non-agitating hauling equipment, provided the consistency and workability of the mixed concrete upon discharge at the delivery point is suitable for adequate placement and consolidation in place, and provided the mixed concrete after hauling to the delivery point conforms to the provisions in Section 90-6.01, "General."
- Truck agitators shall be loaded not to exceed the manufacturer's guaranteed capacity and shall maintain the mixed concrete in a thoroughly mixed and uniform mass during hauling.
- Bodies of non-agitating hauling equipment shall be constructed so that leakage of the concrete mix, or any part thereof, will not occur at any time.
- Concrete hauled in open-top vehicles shall be protected during hauling against rain or against exposure to the sun for more than 20 minutes when the ambient temperature exceeds 24°C.
- No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer. If the Engineer authorizes additional water to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced.
- The rate of discharge of mixed concrete from truck mixer-agitators shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully open.
- When a truck mixer or agitator is used for transporting concrete to the delivery point, discharge shall be completed within 1.5 hours or before 250 revolutions of the drum or blades, whichever occurs first, after the introduction of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30°C or above, the time allowed may be less than 1.5 hours.
- When non-agitating hauling equipment is used for transporting concrete to the delivery point, discharge shall be completed within one hour after the addition of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30°C or above, the time between the introduction of cement to the aggregates and discharge shall not exceed 45 minutes.
- Each load of concrete delivered at the jobsite shall be accompanied by a weighmaster certificate showing the mix identification number, non-repeating load number, date and time at which the materials were batched, the total amount of water added to the load, and for transit-mixed concrete, the reading of the revolution counter at the time the truck mixer is charged with cement. This weighmaster certificate shall also show the actual scale masses (kilograms) for the ingredients batched. Theoretical or target batch masses shall not be used as a substitute for actual scale masses.
- Weighmaster certificates shall be provided in printed form, or if approved by the Engineer, the data may be submitted in electronic media. Electronic media shall be presented in a tab-delimited format on a 90 mm diskette with a capacity of at least 1.4 megabytes. Captured data, for the ingredients represented by each batch shall be "line feed, carriage return" (LFCR) and "one line, separate record" with allowances for sufficient fields to satisfy the amount of data required by these specifications.
- The Contractor may furnish a weighmaster certificate accompanied by a separate certificate that lists the actual batch masses or measurements for a load of concrete provided that both certificates are imprinted with the same non-repeating load number that is unique to the contract and delivered to the jobsite with the load.
- Weighmaster certificates furnished by the Contractor shall conform to the provisions in Section 9-1.01, "Measurement of Quantities."

90-6.04 TIME OR AMOUNT OF MIXING

- Mixing of concrete in paving or stationary mixers shall continue for the required mixing time after all ingredients, except water and admixture, if added with the water, are in the mixing compartment of the mixer before any part of the batch is released. Transfer time in multiple drum mixers shall not be counted as part of the required mixing time.
- The required mixing time, in paving or stationary mixers, of concrete used for concrete structures, except minor structures, shall be not less than 90 seconds or more than 5 minutes, except that when directed by the Engineer in writing, the requirements of the following paragraph shall apply.
- The required mixing time, in paving or stationary mixers, except as provided in the preceding paragraph, shall be not less than 50 seconds or more than 5 minutes.
- The minimum required revolutions at the mixing speed for transit-mixed concrete shall not be less than that recommended by the mixer manufacturer, but in no case shall the number of revolutions be less than that required to consistently produce concrete conforming to the provisions for uniformity in Section 90-6.01, "General."

90-6.05 HAND-MIXING

- Hand-mixed concrete shall be made in batches of not more than 0.25 m³ and shall be mixed on a watertight, level platform. The proper amount of coarse aggregate shall be measured in measuring boxes and spread on the platform and the fine aggregate shall be spread on this layer, the 2 layers being not more than 0.3 meters in total depth. On this mixture shall be spread the dry cement and mineral admixture and the whole mass turned no fewer than 2 times dry; then sufficient clean water shall be added, evenly distributed, and the whole mass again turned no fewer than 3 times, not including placing in the carriers or forms.

90-6.06 AMOUNT OF WATER AND PENETRATION

- The amount of water used in concrete mixes shall be regulated so that the penetration of the concrete as determined by California Test 533 or the slump of the concrete as determined by ASTM Designation: C 143 is within the "Nominal" values shown in the following table. When the penetration or slump of the concrete is found to exceed the nominal values listed, the mixture of subsequent batches shall be adjusted to reduce the penetration or slump to a value within the nominal range shown. Batches of concrete with a penetration or slump exceeding the maximum values listed shall not be used in the work. When Type F or Type G chemical admixtures are added to the mix, the penetration requirements shall not apply and the slump shall not exceed 225 mm after the chemical admixtures are added.

Type of Work	Nominal		Maximum	
	Penetration (mm)	Slump (mm)	Penetration (mm)	Slump (mm)
Concrete Pavement	0-25	—	40	—
Non-reinforced concrete facilities	0-35	—	50	—
Reinforced concrete structures				
Sections over 300-mm thick	0-35	—	65	—
Sections 300-mm thick or less	0-50	—	75	—
Concrete placed under water	—	150-200	—	225
Cast-in-place concrete piles	65-90	130-180	100	200

- The amount of free water used in concrete shall not exceed 183 kg/m³, plus 20 kg for each required 100 kg of cementitious material in excess of 325 kg/m³.

- The term free water is defined as the total water in the mixture minus the water absorbed by the aggregates in reaching a saturated surface-dry condition.

- Where there are adverse or difficult conditions that affect the placing of concrete, the above specified penetration and free water content limitations may be exceeded providing the Contractor is granted permission by the Engineer in writing to increase the cementitious material content per cubic meter of concrete. The increase in water and cementitious material shall be at a ratio not to exceed 30 kg of water per added 100 kg of cementitious material per cubic meter. The cost of additional cementitious material and water added under these conditions shall be at the Contractor's expense and no additional compensation will be allowed therefor.

- The equipment for supplying water to the mixer shall be constructed and arranged so that the amount of water added can be measured accurately. Any method of discharging water into the mixer for a batch shall be accurate within 1.5 percent of the quantity of water required to be added to the mix for any position of the mixer. Tanks used to measure water shall be designed so that water cannot enter while water is being discharged into the mixer and discharge into the mixer shall be made rapidly in one operation without dribbling. All equipment shall be arranged so as to permit checking the amount of water delivered by discharging into measured containers.

90-7 CURING CONCRETE

90-7.01 METHODS OF CURING

- Newly placed concrete shall be cured by the methods specified in this Section 90-7.01 and the special provisions.

90-7.01A Water Method

- The concrete shall be kept continuously wet by the application of water for a minimum curing period of 7 days after the concrete has been placed.

- When a curing medium consisting of cotton mats, rugs, carpets, or earth or sand blankets is to be used to retain the moisture, the entire surface of the concrete shall be kept damp by applying water with a nozzle that so atomizes the flow that a mist and not a spray is formed, until the surface of the concrete is covered with the curing medium. The moisture from the nozzle shall not be applied under pressure directly upon the concrete and shall not be allowed to accumulate on the concrete in a quantity sufficient to cause a flow or wash the surface. At the expiration of the curing period, the concrete surfaces shall be cleared of all curing mediums.

- When concrete bridge decks and flat slabs are to be cured without the use of a curing medium, the entire surface of the bridge deck or slab shall be kept damp by the application of water with an atomizing nozzle as specified in the preceding paragraph, until the concrete has set, after which the entire surface of the concrete shall be sprinkled continuously with water for a period of not less than 7 days.

90-7.01B Curing Compound Method

- Surfaces of the concrete that are exposed to the air shall be sprayed uniformly with a curing compound.
- Curing compounds to be used shall be as follows:

1. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class B, except the resin type shall be poly-alpha-methylstyrene.
2. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class B.
3. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class A.
4. Non-pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class B.
5. Non-pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class A.
6. Non-pigmented curing compound with fugitive dye conforming to the requirements in ASTM Designation: C 309, Type 1-D, Class A.

- The infrared scan for the dried vehicle from curing compound (1) shall match the infrared scan on file at the Transportation Laboratory.

- The loss of water for each type of curing compound, when tested in conformance with the requirements in California Test 534, shall not be more than 0.15-kg/m² in 24 hours or more than 0.45-kg/m² in 72 hours.

- The curing compound to be used will be specified elsewhere in these specifications or in the special provisions.

- When the use of curing compound is required or permitted elsewhere in these specifications or in the special provisions and no specific kind is specified, any of the curing compounds listed above may be used.

- Curing compound shall be applied at a nominal rate of 3.7 m²/L, unless otherwise specified.

- At any point, the application rate shall be within ±1.2 m²/L of the nominal rate specified, and the average application rate shall be within ±0.5 m²/L of the nominal rate specified when tested in conformance with the requirements in California Test 535. Runs, sags, thin areas, skips, or holidays in the applied curing compound shall be evidence that the application is not satisfactory.

- Curing compounds shall be applied using power operated spray equipment. The power operated spraying equipment shall be equipped with an operational pressure gage and a means of controlling the pressure. Hand spraying of small and irregular areas that are not reasonably accessible to mechanical spraying equipment, in the opinion of the Engineer, may be permitted.

- The curing compound shall be applied to the concrete following the surface finishing operation, immediately before the moisture sheen disappears from the surface, but before any drying shrinkage or craze cracks begin to appear. In the event of any drying or cracking of the surface, application of water with an atomizing nozzle as specified in Section 90-7.01A, "Water Method," shall be started immediately and shall be continued until application of the compound is resumed or started; however, the compound shall not be applied over any resulting freestanding water. Should the film of compound be damaged from any cause before the expiration of 7 days after the concrete is placed in the case of structures and 72 hours in the case of pavement, the damaged portion shall be repaired immediately with additional compound.

- At the time of use, compounds containing pigments shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. A paddle shall be used to loosen all settled pigment from the bottom of the container, and a power driven agitator shall be used to disperse the pigment uniformly throughout the vehicle.

- Agitation shall not introduce air or other foreign substance into the curing compound.

- The manufacturer shall include in the curing compound the necessary additives for control of sagging, pigment settling, leveling, de-emulsification, or other requisite qualities of a satisfactory working material. Pigmented curing compounds shall be manufactured so that the pigment does not settle badly, does not cake or thicken in the container, and does not become granular or curdled. Settlement of pigment shall be a thoroughly wetted, soft, mushy mass permitting the complete and easy vertical penetration of a paddle. Settled pigment shall be easily redispersed, with minimum resistance to the sideways manual motion of the paddle across the bottom of the container, to form a smooth uniform product of the proper consistency.

- Curing compounds shall remain sprayable at temperatures above 4°C and shall not be diluted or altered after manufacture.
- The curing compound shall be packaged in clean 210-L barrels or round 19-L containers or shall be supplied from a suitable storage tank located at the jobsite. The containers shall comply with "Title 49, Code of Federal Regulations, Hazardous Materials Regulations." The 210-L barrels shall have removable lids and airtight fasteners. The 19-L containers shall be round and have standard full open head and bail. Lids with bungholes shall not be permitted. On-site storage tanks shall be kept clean and free of contaminants. Each tank shall have a permanent system designed to completely redisperse settled material without introducing air or other foreign substances.
- Steel containers and lids shall be lined with a coating that will prevent destructive action by the compound or chemical agents in the air space above the compound. The coating shall not come off the container or lid as skins. Containers shall be filled in a manner that will prevent skinning. Plastic containers shall not react with the compound.
- Each container shall be labeled with the manufacturer's name, kind of curing compound, batch number, volume, date of manufacture, and volatile organic compound (VOC) content. The label shall also warn that the curing compound containing pigment shall be well stirred before use. Precautions concerning the handling and the application of curing compound shall be shown on the label of the curing compound containers in conformance with the Construction Safety Orders and General Industry Safety Orders of the State of California.
- Containers of curing compound shall be labeled to indicate that the contents fully comply with the rules and regulations concerning air pollution control in the State of California.
- When the curing compound is shipped in tanks or tank trucks, a shipping invoice shall accompany each load. The invoice shall contain the same information as that required herein for container labels.
- Curing compound will be sampled by the Engineer at the source of supply or at the jobsite or at both locations.
- Curing compound shall be formulated so as to maintain the specified properties for a minimum of one year. The Engineer may require additional testing before use to determine compliance with these specifications if the compound has not been used within one year or whenever the Engineer has reason to believe the compound is no longer satisfactory.
- Tests will be conducted in conformance with the latest ASTM test methods and methods in use by the Transportation Laboratory.

90-7.01C Waterproof Membrane Method

- The exposed finished surfaces of concrete shall be sprayed with water, using a nozzle that so atomizes the flow that a mist and not a spray is formed, until the concrete has set, after which the curing membrane shall be placed. The curing membrane shall remain in place for a period of not less than 72 hours.
- Sheeting material for curing concrete shall conform to the requirements in AASHTO Designation: M 171 for white reflective materials.
- The sheeting material shall be fabricated into sheets of such width as to provide a complete cover for the entire concrete surface. Joints in the sheets shall be securely cemented together in such a manner as to provide a waterproof joint. The joint seams shall have a minimum lap of 100 mm.
- The sheets shall be securely weighted down by placing a bank of earth on the edges of the sheets or by other means satisfactory to the Engineer.
- Should any portion of the sheets be broken or damaged before the expiration of 72 hours after being placed, the broken or damaged portions shall be immediately repaired with new sheets properly cemented into place.
- Sections of membrane that have lost their waterproof qualities or have been damaged to such an extent as to render them unfit for curing the concrete shall not be used.

90-7.01D Forms-In-Place Method

- Formed surfaces of concrete may be cured by retaining the forms in place. The forms shall remain in place for a minimum period of 7 days after the concrete has been placed, except that for members over 0.5-m in least dimension the forms shall remain in place for a minimum period of 5 days.
- Joints in the forms and the joints between the end of forms and concrete shall be kept moisture tight during the curing period. Cracks in the forms and cracks between the forms and the concrete shall be resealed by methods subject to the approval of the Engineer.

90-7.02 CURING PAVEMENT

- The entire exposed area of the pavement, including edges, shall be cured by the waterproof membrane method, or curing compound method using curing compound (1) or (2) as the Contractor may elect. Should the side forms be removed before the expiration of 72 hours following the start of curing, the exposed pavement edges shall also be cured. If the pavement is cured by means of the curing compound method, the sawcut and all portions of the curing compound that have been disturbed by sawing operations shall be restored by spraying with additional curing compound.

- Curing shall commence as soon as the finishing process provided in Section 40-1.10, "Final Finishing," has been completed. The method selected shall conform to the provisions in Section 90-7.01, "Methods of Curing."
- When the curing compound method is used, the compound shall be applied to the entire pavement surface by mechanical sprayers. Spraying equipment shall be of the fully atomizing type equipped with a tank agitator that provides for continual agitation of the curing compound during the time of application. The spray shall be adequately protected against wind, and the nozzles shall be so oriented or moved mechanically transversely as to result in the minimum specified rate of coverage being applied uniformly on exposed faces. Hand spraying of small and irregular areas, and areas inaccessible to mechanical spraying equipment, in the opinion of the Engineer, will be permitted. When the ambient air temperature is above 15°C, the Contractor shall fog the surface of the concrete with a fine spray of water as specified in Section 90-7.01A, "Water Method." The surface of the pavement shall be kept moist between the hours of 10:00 a.m. and 4:30 p.m. on the day the concrete is placed. However, the fogging done after the curing compound has been applied shall not begin until the compound has set sufficiently to prevent displacement. Fogging shall be discontinued if ordered in writing by the Engineer.

90-7.03 CURING STRUCTURES

- Newly placed concrete for cast-in-place structures, other than highway bridge decks, shall be cured by the water method, the forms-in-place method, or, as permitted herein, by the curing compound method, in conformance with the provisions in Section 90-7.01, "Methods of Curing."
- The curing compound method using a pigmented curing compound may be used on concrete surfaces of construction joints, surfaces that are to be buried underground, and surfaces where only Ordinary Surface Finish is to be applied and on which a uniform color is not required and that will not be visible from a public traveled way. If the Contractor elects to use the curing compound method on the bottom slab of box girder spans, the curing compound shall be curing compound (1).
- The top surface of highway bridge decks shall be cured by both the curing compound method and the water method. The curing compound shall be curing compound (1).
- Concrete surfaces of minor structures, as defined in Section 51-1.02, "Minor Structures," shall be cured by the water method, the forms-in-place method or the curing compound method.
- When deemed necessary by the Engineer during periods of hot weather, water shall be applied to concrete surfaces being cured by the curing compound method or by the forms-in-place method, until the Engineer determines that a cooling effect is no longer required. Application of water for this purpose will be paid for as extra work as provided in Section 4-1.03D, "Extra Work."

90-7.04 CURING PRECAST CONCRETE MEMBERS

- Precast concrete members shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing." Curing shall be provided for the minimum time specified for each method or until the concrete reaches its design strength, whichever is less. Steam curing may also be used for precast members and shall conform to the following provisions:
 - A. After placement of the concrete, members shall be held for a minimum 4-hour presteaming period. If the ambient air temperature is below 10°C, steam shall be applied during the presteaming period to hold the air surrounding the member at a temperature between 10°C and 32°C.
 - B. To prevent moisture loss on exposed surfaces during the presteaming period, members shall be covered as soon as possible after casting or the exposed surfaces shall be kept wet by fog spray or wet blankets.
 - C. Enclosures for steam curing shall allow free circulation of steam about the member and shall be constructed to contain the live steam with a minimum moisture loss. The use of tarpaulins or similar flexible covers will be permitted, provided they are kept in good repair and secured in such a manner as to prevent the loss of steam and moisture.
 - D. Steam at the jets shall be at low pressure and in a saturated condition. Steam jets shall not impinge directly on the concrete, test cylinders, or forms. During application of the steam, the temperature rise within the enclosure shall not exceed 22°C per hour. The curing temperature throughout the enclosure shall not exceed 65°C and shall be maintained at a constant level for a sufficient time necessary to develop the required transfer strength. Control cylinders shall be covered to prevent moisture loss and shall be placed in a location where temperature is representative of the average temperature of the enclosure.
 - E. Temperature recording devices that will provide an accurate, continuous, permanent record of the curing temperature shall be provided. A minimum of one temperature recording device per 60 m of continuous bed length will be required for checking temperature.
 - F. Members in pretension beds shall be detensioned immediately after the termination of steam curing while the concrete and forms are still warm, or the temperature under the enclosure shall be maintained above 15°C until the stress is transferred to the concrete.

G. Curing of precast concrete will be considered completed after termination of the steam curing cycle.

90-7.05 CURING PRECAST PRESTRESSED CONCRETE PILES

- Newly placed concrete for precast prestressed concrete piles shall be cured in conformance with the provisions in Section 90-7.04, "Curing Precast Concrete Members," except that piles with a class designation ending in C (corrosion resistant) shall be cured as follows:

- Piles shall be either steam cured or water cured. If water curing is used, the piles shall be kept continuously wet by the application of water in conformance with the provisions in Section 90-7.01A, "Water Method."
- If steam curing is used, the steam curing provisions in Section 90-7.04, "Curing Precast Concrete Members," shall apply except that the piles shall be kept continuously wet for their entire length for a period of not less than 3 days, including the holding and steam curing periods.

90-7.06 CURING SLOPE PROTECTION

- Concrete slope protection shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing."
- Concreted-rock slope protection shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing," or with a blanket of earth kept wet for 72 hours, or by sprinkling with a fine spray of water every 2 hours during the daytime for a period of 3 days.

90-7.07 CURING MISCELLANEOUS CONCRETE WORK

- Exposed surfaces of curbs shall be cured by pigmented curing compounds as specified in Section 90-7.01B, "Curing Compound Method."
- Concrete sidewalks, gutter depressions, island paving, curb ramps, driveways, and other miscellaneous concrete areas shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing."
- Shotcrete shall be cured for at least 72 hours by spraying with water, or by a moist earth blanket, or by any of the methods provided in Section 90-7.01, "Methods of Curing."
- Mortar and grout shall be cured by keeping the surface damp for 3 days.
- After placing, the exposed surfaces of sign structure foundations, including pedestal portions, if constructed, shall be cured for at least 72 hours by spraying with water, or by a moist earth blanket, or by any of the methods provided in Section 90-7.01, "Methods of Curing."

90-8 PROTECTING CONCRETE

90-8.01 GENERAL

- In addition to the provisions in Section 7-1.16, "Contractor's Responsibility for the Work and Materials," the Contractor shall protect concrete as provided in this Section 90-8.
- Concrete shall not be placed on frozen or ice-coated ground or subgrade nor on ice-coated forms, reinforcing steel, structural steel, conduits, precast members, or construction joints.
- Under rainy conditions, placing of concrete shall be stopped before the quantity of surface water is sufficient to damage surface mortar or cause a flow or wash of the concrete surface, unless the Contractor provides adequate protection against damage.
- Concrete that has been frozen or damaged by other causes, as determined by the Engineer, shall be removed and replaced by the Contractor at the Contractor's expense.

90-8.02 PROTECTING CONCRETE STRUCTURES

- Structure concrete and shotcrete used as structure concrete shall be maintained at a temperature of not less than 7°C for 72 hours after placing and at not less than 4°C for an additional 4 days. When required by the Engineer, the Contractor shall submit a written outline of the proposed methods for protecting the concrete.

90-8.03 PROTECTING CONCRETE PAVEMENT

- Pavement concrete shall be maintained at a temperature of not less than 4°C for 72 hours. When required by the Engineer, the Contractor shall submit a written outline of the proposed methods for protecting the concrete.
- Except as provided in Section 7-1.08, "Public Convenience," the Contractor shall protect concrete pavement against construction and other activities that abrade, scar, discolor, reduce texture depth, lower coefficient of friction, or otherwise damage the surface. Stockpiling, drifting, or excessive spillage of soil, gravel, petroleum products, and concrete or asphalt mixes on the surface of concrete pavement is prohibited unless otherwise specified in these specifications, the special provisions or permitted by the Engineer.

- When ordered by the Engineer or shown on the plans or specified in the special provisions, pavement crossings shall be constructed for the convenience of public traffic. The material and work necessary for the construction of the crossings, and their subsequent removal and disposal, will be paid for at the contract unit prices for the items of work involved and if there are no contract items for the work involved, payment for pavement crossings will be made by extra work as provided in Section 4-1.03D, "Extra Work.". Where public traffic will be required to cross over the new pavement, Type III portland cement may be used in concrete, if permitted in writing by the Engineer. The pavement may be opened to traffic as soon as the concrete has developed a modulus of rupture of 3.8 MPa. The modulus of rupture will be determined by California Test 523.

- No traffic or Contractor's equipment, except as hereinafter provided, will be permitted on the pavement before a period of 10 days has elapsed after the concrete has been placed, nor before the concrete has developed a modulus of rupture of at least 3.8 MPa. Concrete that fails to attain a modulus of rupture of 3.8 MPa within 10 days shall not be opened to traffic until directed by the Engineer.

- Equipment for sawing weakened plane joints will be permitted on the pavement as specified in Section 40-1.08B, "Weakened Plane Joints."

- When requested in writing by the Contractor, the tracks on one side of paving equipment will be permitted on the pavement after a modulus of rupture of 2.4 MPa has been attained, provided that:

- A. Unit pressure exerted on the pavement by the paver shall not exceed 135 kPa;

- B. Tracks with cleats, grousers, or similar protuberances shall be modified or shall travel on planks or equivalent protective material, so that the pavement is not damaged; and

- C. No part of the track shall be closer than 0.3-m from the edge of pavement.

- In case of visible cracking of, or other damage to the pavement, operation of the paving equipment on the pavement shall be immediately discontinued.

- Damage to the pavement resulting from early use of pavement by the Contractor's equipment as provided above shall be repaired by the Contractor at the Contractor's expense.

- The State will furnish the molds and machines for testing the concrete for modulus of rupture, and the Contractor, at the Contractor's expense, shall furnish the material and whatever labor the Engineer may require.

90-9 COMPRESSIVE STRENGTH

90-9.01 GENERAL

- Concrete compressive strength requirements consist of a minimum strength that shall be attained before various loads or stresses are applied to the concrete and, for concrete designated by strength, a minimum strength at the age of 28 days or at the age otherwise allowed in Section 90-1.01, "Description." The various strengths required are specified in these specifications or the special provisions or are shown on the plans.

- The compressive strength of concrete will be determined from test cylinders that have been fabricated from concrete sampled in conformance with the requirements of California Test 539. Test cylinders will be molded and initially field cured in conformance with California Test 540. Test cylinders will be cured and tested after receipt at the testing laboratory in conformance with the requirements of California Test 521. A strength test shall consist of the average strength of 2 cylinders fabricated from material taken from a single load of concrete, except that, if any cylinder should show evidence of improper sampling, molding, or testing, that cylinder shall be discarded and the strength test shall consist of the strength of the remaining cylinder.

- When concrete compressive strength is specified as a prerequisite to applying loads or stresses to a concrete structure or member, test cylinders for other than steam cured concrete will be cured in conformance with Method 1 of California Test 540. The compressive strength of concrete determined for these purposes will be evaluated on the basis of individual tests.

- When concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete strength to be used as a basis for acceptance of other than steam cured concrete will be determined from cylinders cured in conformance with Method 1 of California Test 540. If the result of a single compressive strength test at the maximum age specified or allowed is below the specified strength but is 95 percent or more of the specified strength, the Contractor shall, at the Contractor's expense, make corrective changes, subject to approval of the Engineer, in the mix proportions or in the concrete fabrication procedures, before placing additional concrete, and shall pay to the State \$14 for each in-place cubic meter of concrete represented by the deficient test. If the result of a single compressive strength test at the maximum age specified or allowed is below 95 percent of the specified strength, but is 85 percent or more of the specified strength, the Contractor shall make the corrective changes specified above, and shall pay to the State \$20 for each in place cubic meter of concrete represented by the deficient test. In addition, such corrective changes shall be made when the compressive strength of concrete tested at 7 days indicates, in the judgment of the Engineer, that the concrete will not attain the required compressive strength at the maximum age specified or allowed. Concrete represented by a single test that indicates a compressive strength of less than 85 percent of the specified 28-day compressive strength will be rejected in conformance with the provisions in Section 6-1.04, "Defective Materials."

- If the test result indicates that the compressive strength at the maximum curing age specified or allowed is below the specified strength, but is 85 percent or more of the specified strength, payments to the State as required above shall be made, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength of the concrete placed in the work meets or exceeds the specified 28-day compressive strength. If the test result indicates a compressive strength at the maximum curing age specified or allowed below 85 percent, the concrete represented by that test will be rejected, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength and quality of the concrete placed in the work are acceptable. If the evidence consists of tests made on cores taken from the work, the cores shall be obtained and tested in conformance with the requirements in ASTM Designation: C 42.

- No single compressive strength test shall represent more than 250 m³.

- When a precast concrete member is steam cured, the compressive strength of the concrete will be determined from test cylinders that have been handled and stored in conformance with Method 3 of California Test 540. The compressive strength of steam cured concrete will be evaluated on the basis of individual tests representing specific portions of production. When the concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete shall be considered to be acceptable whenever its compressive strength reaches the specified 28-day compressive strength provided that strength is reached in not more than the maximum number of days specified or allowed after the member is cast.

- When concrete is specified by compressive strength, prequalification of materials, mix proportions, mixing equipment, and procedures proposed for use will be required prior to placement of the concrete. Prequalification shall be accomplished by the submission of acceptable certified test data or trial batch reports by the Contractor. Prequalification data shall be based on the use of materials, mix proportions, mixing equipment, procedures, and size of batch proposed for use in the work.

- Certified test data, in order to be acceptable, shall indicate that not less than 90 percent of at least 20 consecutive tests exceed the specified strength at the maximum number of cure days specified or allowed, and none of those tests are less than 95 percent of specified strength. Strength tests included in the data shall be the most recent tests made on concrete of the proposed mix design and all shall have been made within one year of the proposed use of the concrete.

- Trial batch test reports, in order to be acceptable, shall indicate that the average compressive strength of 5 consecutive concrete cylinders, taken from a single batch, at not more than 28 days (or the maximum age allowed) after molding shall be at least 4 MPa greater than the specified 28-day compressive strength, and no individual cylinder shall have a strength less than the specified strength at the maximum age specified or allowed. Data contained in the report shall be from trial batches that were produced within one year of the proposed use of specified strength concrete in the project. Whenever air-entrainment is required, the air content of trial batches shall be equal to or greater than the air content specified for the concrete without reduction due to tolerances.

- Tests shall be performed in conformance with either the appropriate California Test methods or the comparable ASTM test methods. Equipment employed in testing shall be in good condition and shall be properly calibrated. If the tests are performed during the life of the contract, the Engineer shall be notified sufficiently in advance of performing the tests in order to witness the test procedures.

- The certified test data and trial batch test reports shall include the following information:

- A. Date of mixing.
- B. Mixing equipment and procedures used.
- C. The size of batch in cubic meters and the mass, type, and source of all ingredients used.
- D. Penetration of the concrete.
- E. The air content of the concrete if an air-entraining admixture is used.
- F. The age at time of testing and strength of all concrete cylinders tested.

- Certified test data and trial batch test reports shall be signed by an official of the firm that performed the tests.
- When approved by the Engineer, concrete from trial batches may be used in the work at locations where concrete of a lower quality is required and the concrete will be paid for as the type or class of concrete required at that location.
- After materials, mix proportions, mixing equipment, and procedures for concrete have been prequalified for use, additional prequalification by testing of trial batches will be required prior to making changes that, in the judgment of the Engineer, could result in a strength of concrete below that specified.
- The Contractor's attention is directed to the time required to test trial batches and the Contractor shall be responsible for production of trial batches at a sufficiently early date so that the progress of the work is not delayed.
- When precast concrete members are manufactured at the plant of an established manufacturer of precast concrete members, the mix proportions of the concrete shall be determined by the Contractor, and a trial batch and prequalification of the materials, mix proportions, mixing equipment, and procedures will not be required.

90-10 MINOR CONCRETE

90-10.01 GENERAL

- Concrete for minor structures, slope paving, curbs, sidewalks and other concrete work, when designated as minor concrete on the plans, in the specifications, or in the contract item, shall conform to the provisions specified herein.
- The Engineer, at the Engineer's discretion, will inspect and test the facilities, materials and methods for producing the concrete to ensure that minor concrete of the quality suitable for use in the work is obtained.

90-10.02 MATERIALS

- Minor concrete shall conform to the following requirements:

90-10.02A Cementitious Material

- Cementitious material shall conform to the provisions in Section 90-1.01, "Description."

90-10.02B Aggregate

- Aggregate shall be clean and free from deleterious coatings, clay balls, roots, and other extraneous materials.
- The Contractor shall submit to the Engineer for approval, a grading of the combined aggregate proposed for use in the minor concrete. After acceptance of the grading, aggregate furnished for minor concrete shall conform to that grading, unless a change is authorized in writing by the Engineer.
- The Engineer may require the Contractor to furnish periodic test reports of the aggregate grading furnished. The maximum size of aggregate used shall be at the option of the Contractor, but in no case shall the maximum size be larger than 37.5 mm or smaller than 19 mm.
- The Engineer may waive, in writing, the gradation requirements in this Section 90-10.02B, if, in the Engineer's opinion, the furnishing of the gradation is not necessary for the type or amount of concrete work to be constructed.

90-10.02C Water

- Water used for washing, mixing, and curing shall be free from oil, salts, and other impurities that would discolor or etch the surface or have an adverse affect on the quality of the concrete.

90-10.02D Admixtures

- The use of admixtures shall conform to the provisions in Section 90-4, "Admixtures."

90-10.03 PRODUCTION

- Cementitious material, water, aggregate, and admixtures shall be stored, proportioned, mixed, transported, and discharged in conformance with recognized standards of good practice that will result in concrete that is thoroughly and uniformly mixed, that is suitable for the use intended, and that conforms to requirements specified herein. Recognized standards of good practice are outlined in various industry publications such as are issued by American Concrete Institute, AASHTO, or the Department.
- The cementitious material content of minor concrete shall conform to the provisions in Section 90-1.01, "Description."
- The amount of water used shall result in a consistency of concrete conforming to the provisions in Section 90-6.06, "Amount of Water and Penetration." Additional mixing water shall not be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer.

- Discharge of ready-mixed concrete from the transporting vehicle shall be made while the concrete is still plastic and before stiffening occurs. An elapsed time of 1.5 hours (one hour in non-agitating hauling equipment), or more than 250 revolutions of the drum or blades, after the introduction of the cementitious material to the aggregates, or a temperature of concrete of more than 32°C will be considered conditions contributing to the quick stiffening of concrete. The Contractor shall take whatever action is necessary to eliminate quick stiffening, except that the addition of water will not be permitted.

- The required mixing time in stationary mixers shall be not less than 50 seconds or more than 5 minutes.

- The minimum required revolutions at mixing speed for transit-mixed concrete shall be not less than that recommended by the mixer manufacturer, and shall be increased, if necessary, to produce thoroughly and uniformly mixed concrete.

- Each load of ready-mixed concrete shall be accompanied by a weighmaster certificate that shall be delivered to the Engineer at the discharge location of the concrete, unless otherwise directed by the Engineer. The weighmaster certificate shall be clearly marked with the date and time of day when the load left the batching plant and, if hauled in truck mixers or agitators, the time the mixing cycle started.

- A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished to the Engineer, prior to placing minor concrete from a source not previously used on the contract, stating that minor concrete to be furnished meets contract requirements, including minimum cementitious material content specified.

90-10.04 CURING MINOR CONCRETE

- Curing minor concrete shall conform to the provisions in Section 90-7, "Curing Concrete."

90-10.05 PROTECTING MINOR CONCRETE

- Protecting minor concrete shall conform to the provisions in Section 90-8, "Protecting Concrete," except the concrete shall be maintained at a temperature of not less than 4°C for 72 hours after placing.

90-10.06 MEASUREMENT AND PAYMENT

- Minor concrete will be measured and paid for in conformance with the provisions specified in the various sections of these specifications covering concrete construction when minor concrete is specified in the specifications, shown on the plans, or indicated by contract item in the Engineer's Estimate.

90-11 MEASUREMENT AND PAYMENT

90-11.01 MEASUREMENT

- Portland cement concrete will be measured in conformance with the provisions specified in the various sections of these specifications covering construction requiring concrete.

- When it is provided that concrete will be measured at the mixer, the volume in cubic meters shall be computed as the total mass of the batch in kilograms divided by the density of the concrete in kilograms per cubic meter. The total mass of the batch shall be calculated as the sum of all materials, including water, entering the batch. The density of the concrete will be determined in conformance with the requirements in California Test 518.

90-11.02 PAYMENT

- Portland cement concrete will be paid for in conformance with the provisions specified in the various sections of these specifications covering construction requiring concrete.

- Full compensation for furnishing and incorporating admixtures required by these specifications or the special provisions will be considered as included in the contract prices paid for the concrete involved and no additional compensation will be allowed therefor.

- Should the Engineer order the Contractor to incorporate any admixtures in the concrete when their use is not required by these specifications or the special provisions, furnishing the admixtures and adding them to the concrete will be paid for as extra work as provided in Section 4-1.03D, "Extra Work."

- Should the Contractor use admixtures in conformance with the provisions in Section 90-4.05, "Optional Use of Chemical Admixtures," or Section 90-4.07, "Optional Use of Air-entraining Admixtures," or should the Contractor request and obtain permission to use other admixtures for the Contractor's benefit, the Contractor shall furnish those admixtures and incorporate them into the concrete at the Contractor's expense and no additional compensation will be allowed therefor.

END OF AMENDMENTS

SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS

2-1.01 GENERAL

The bidder's attention is directed to the provisions in Section 2, "Proposal Requirements and Conditions," of the Standard Specifications and these special provisions for the requirements and conditions which the bidder must observe in the preparation of the Proposal form and the submission of the bid.

In addition to the subcontractors required to be listed in conformance with Section 2-1.054, "Required Listing of Proposed Subcontractors," of the Standard Specifications, each proposal shall have listed therein the portion of work that will be performed by each subcontractor listed.

The Bidder's Bond form mentioned in the last paragraph in Section 2-1.07, "Proposal Guaranty," of the Standard Specifications will be found following the signature page of the Proposal.

Submit request for substitution of an "or equal" item, and the data substantiating the request to the Department of Transportation, District 8 Construction, MS 1104, 464 West 4th Street, 6th Floor, San Bernardino, Ca 92401-1400, so that the request is received by the Department by close of business on the fourth day, not including Saturdays, Sundays and legal holidays, following bid opening.

In conformance with Public Contract Code Section 7106, a Noncollusion Affidavit is included in the Proposal. Signing the Proposal shall also constitute signature of the Noncollusion Affidavit.

The contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate. Each subcontract signed by the bidder must include this assurance.

2-1.015 FEDERAL LOBBYING RESTRICTIONS

Section 1352, Title 31, United States Code prohibits Federal funds from being expended by the recipient or any lower tier subrecipient of a Federal-aid contract to pay for any person for influencing or attempting to influence a Federal agency or Congress in connection with the awarding of any Federal-aid contract, the making of any Federal grant or loan, or the entering into of any cooperative agreement.

If any funds other than Federal funds have been paid for the same purposes in connection with this Federal-aid contract, the recipient shall submit an executed certification and, if required, submit a completed disclosure form as part of the bid documents.

A certification for Federal-aid contracts regarding payment of funds to lobby Congress or a Federal agency is included in the Proposal. Standard Form - LLL, "Disclosure of Lobbying Activities," with instructions for completion of the Standard Form is also included in the Proposal. Signing the Proposal shall constitute signature of the Certification.

The above-referenced certification and disclosure of lobbying activities shall be included in each subcontract and any lower-tier contracts exceeding \$100,000. All disclosure forms, but not certifications, shall be forwarded from tier to tier until received by the Engineer.

The Contractor, subcontractors and any lower-tier contractors shall file a disclosure form at the end of each calendar quarter in which there occurs any event that requires disclosure or that materially affects the accuracy of the information contained in any disclosure form previously filed by the Contractor, subcontractors and any lower-tier contractors. An event that materially affects the accuracy of the information reported includes:

- A. A cumulative increase of \$25,000 or more in the amount paid or expected to be paid for influencing or attempting to influence a covered Federal action; or
- B. A change in the person(s) or individual(s) influencing or attempting to influence a covered Federal action; or,
- C. A change in the officer(s), employee(s), or Member(s) contacted to influence or attempt to influence a covered Federal action.

2-1.02 DISADVANTAGED BUSINESS ENTERPRISE (DBE)

This project is subject to Part 26, Title 49, Code of Federal Regulations entitled "Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs." The Regulations in their entirety are incorporated herein by this reference.

Bidders shall be fully informed respecting the requirements of the Regulations and the Department's Disadvantaged Business Enterprise (DBE) program developed pursuant to the Regulations; particular attention is directed to the following matters:

- A. A DBE must be a small business concern as defined pursuant to Section 3 of U.S. Small Business Act and relevant regulations promulgated pursuant thereto.
- B. A DBE may participate as a prime contractor, subcontractor, joint venture partner with a prime or subcontractor, vendor of material or supplies, or as a trucking company.

- C. A DBE bidder, not bidding as a joint venture with a non-DBE, will be required to document one or a combination of the following:
1. The bidder will meet the goal by performing work with its own forces.
 2. The bidder will meet the goal through work performed by DBE subcontractors, suppliers or trucking companies.
 3. The bidder, prior to bidding, made adequate good faith efforts to meet the goal.
- D. A DBE joint venture partner must be responsible for specific contract items of work, or portions thereof. Responsibility means actually performing, managing and supervising the work with its own forces. The DBE joint venture partner must share in the capital contribution, control, management, risks and profits of the joint venture. The DBE joint venturer must submit the joint venture agreement with the proposal or the DBE Information form required in the Section entitled "Submission of DBE Information" of these special provisions.
- E. A DBE must perform a commercially useful function, i.e., must be responsible for the execution of a distinct element of the work and must carry out its responsibility by actually performing, managing and supervising the work.
- F. DBEs must be certified by either the California Department of Transportation, or by a participating State of California or local agency which certifies in conformance with Title 49, Code of Federal Regulations, Part 26, as of the date of bid opening. It is the Contractor's responsibility to verify that DBEs are certified. Listings of DBEs certified by the Department are available from the following sources:
1. The Department's DBE Directory, which is published quarterly. This Directory may be obtained from the Department of Transportation, Materiel Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520.
 2. The Department's Electronic Information Bulletin Board Service, which is accessible by modem and is updated weekly. The Bulletin Board may be accessed by first contacting the Department's Business Enterprise Program at Telephone: (916) 227-8937 and obtaining a user identification and password.
 3. The Department's web site at <http://www.dot.ca.gov/hq/bep/index.htm>.
 4. The organizations listed in the Section entitled "DBE Goal for this Project" of these special provisions.
- G. Credit for materials or supplies purchased from DBEs will be as follows:
1. If the materials or supplies are obtained from a DBE manufacturer, 100 percent of the cost of the materials or supplies will count toward the DBE goal. A DBE manufacturer is a firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract and of the general character described by the specifications.
 2. If the materials or supplies are purchased from a DBE regular dealer, 60 percent of the cost of the materials or supplies will count toward the DBE goal. A DBE regular dealer is a firm that owns, operates, or maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. To be a DBE regular dealer, the firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question. A person may be a DBE regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business as provided in this paragraph G.2. if the person both owns and operates distribution equipment for the products. Any supplementing of regular dealers' own distribution equipment shall be by a long-term lease agreement and not on an ad hoc or contract-by-contract basis. Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not DBE regular dealers within the meaning of this paragraph G.2.
 3. Credit for materials or supplies purchased from a DBE which is neither a manufacturer nor a regular dealer will be limited to the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site, provided the fees are reasonable and not excessive as compared with fees charged for similar services.
- H. Credit for DBE trucking companies will be as follows:
1. The DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract, and there cannot be a contrived arrangement for the purpose of meeting the DBE goal.

2. The DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
 3. The DBE receives credit for the total value of the transportation services it provides on the contract using trucks it owns, insures, and operates using drivers it employs.
 4. The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the contract.
 5. The DBE may also lease trucks from a non-DBE firm, including an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement. The DBE does not receive credit for the total value of the transportation services provided by the lessee, since these services are not provided by a DBE.
 6. For the purposes of this paragraph H, a lease must indicate that the DBE has exclusive use of and control over the truck. This does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, so long as the lease gives the DBE absolute priority for use of the leased truck. Leased trucks must display the name and identification number of the DBE.
- I. Noncompliance by the Contractor with the requirements of the regulations constitutes a breach of this contract and may result in termination of the contract or other appropriate remedy for a breach of this contract.
 - J. Bidders are encouraged to use services offered by financial institutions owned and controlled by DBEs.

2-1.02A DBE GOAL FOR THIS PROJECT

The Department has established the following goal for Disadvantaged Business Enterprise (DBE) participation for this project:

Disadvantaged Business Enterprise (DBE): 10 percent

Bidders may use the services of the following firms to contact interested DBEs. These firms are available to assist DBEs in preparing bids for subcontracting or supplying materials.

The following firms may be contacted for projects in the following locations:

<p>Districts 04, 05 (except San Luis Obispo and Santa Barbara Counties), 06 (except Kern County) and 10:</p> <p>Triaxial Management Services, Inc. - Oakland</p> <p>1545 Willow Street, 1st Floor Oakland, CA 94607 Telephone - (510) 286-1313 FAX No. - (510) 286-6792</p>	<p>Districts 08, 11 and 12:</p> <p>Triaxial Management Services, Inc. - San Diego 2725 Congress Street, Suite 1-D San Diego, CA 92110 Telephone - (619) 543-5109 FAX No. - (619) 543-5108</p>
<p>Districts 07 and 08; in San Luis Obispo and Santa Barbara Counties in District 05; and in Kern County in District 06:</p> <p>Triaxial Management Services, Inc. - Los Angeles 2594 Industry Way, Suite 101 Lynwood, CA 90262 Telephone - (310) 537-6677 FAX No. - (310) 637-0128</p>	<p>Districts 01, 02, 03 and 09:</p> <p>Triaxial Management Services, Inc. - Sacramento 930 Alhambra Blvd., #205 Sacramento, CA 95816 Telephone - (916) 553-4172 FAX No. - (916) 553-4173</p>

2-1.02B SUBMISSION OF DBE INFORMATION

The required DBE information shall be submitted on the "CALTRANS BIDDER - DBE INFORMATION" form included in the Proposal. If the DBE information is not submitted with the bid, the DBE Information form shall be removed from the documents prior to submitting the bid.

It is the bidder's responsibility to make enough work available to DBEs and to select those portions of the work or material needs consistent with the available DBEs to meet the goal for DBE participation or to provide information to establish that, prior to bidding, the bidder made adequate good faith efforts to do so.

If DBE information is not submitted with the bid, the apparent successful bidder (low bidder), the second low bidder and the third low bidder shall submit DBE information to the Department of Transportation, 1120 N Street, Room 0200, MS #26, Sacramento, California 95814 so the information is received by the Department no later than 4:00 p.m. on the fourth day, not including Saturdays, Sundays and legal holidays, following bid opening. DBE information sent by U.S. Postal Service certified mail with return receipt and certificate of mailing and mailed on or before the third day, not including Saturdays, Sundays and legal holidays, following bid opening will be accepted even if it is received after the fourth day following bid opening. Failure to submit the required DBE information by the time specified will be grounds for finding the bid or proposal nonresponsive. Other bidders need not submit DBE information unless requested to do so by the Department.

The bidder's DBE information shall establish that good faith efforts to meet the DBE goal have been made. To establish good faith efforts, the bidder shall demonstrate that the goal will be met or that, prior to bidding, adequate good faith efforts to meet the goal were made.

Bidders are cautioned that even though their submittal indicates they will meet the stated DBE goal, their submittal should also include their adequate good faith efforts information along with their DBE goal information to protect their eligibility for award of the contract in the event the Department, in its review, finds that the goal has not been met.

The bidder's DBE information shall include the names, addresses and phone numbers of DBE firms that will participate, with a complete description of work or supplies to be provided by each, the dollar value of each DBE transaction, and a written confirmation from the DBE that it is participating in the contract. A copy of the DBE's quote will serve as written confirmation that the DBE is participating in the contract. When 100 percent of a contract item of work is not to be performed or furnished by a DBE, a description of the exact portion of that work to be performed or furnished by that DBE shall be included in the DBE information, including the planned location of that work. The work that a DBE prime contractor has committed to performing with its own forces as well as the work that it has committed to be performed by DBE subcontractors, suppliers and trucking companies will count toward the goal.

The information necessary to establish the bidder's adequate good faith efforts to meet the DBE goal should include:

- A. The names and dates of each publication in which a request for DBE participation for this project was placed by the bidder.
- B. The names and dates of written notices sent to certified DBEs soliciting bids for this project and the dates and methods used for following up initial solicitations to determine with certainty whether the DBEs were interested.
- C. The items of work which the bidder made available to DBE firms, including, where appropriate, any breaking down of the contract work items (including those items normally performed by the bidder with its own forces) into economically feasible units to facilitate DBE participation. It is the bidder's responsibility to demonstrate that sufficient work to meet the DBE goal was made available to DBE firms.
- D. The names, addresses and phone numbers of rejected DBE firms, the firms selected for that work, and the reasons for the bidder's choice.
- E. Efforts made to assist interested DBEs in obtaining bonding, lines of credit or insurance, and any technical assistance or information related to the plans, specifications and requirements for the work which was provided to DBEs.
- F. Efforts made to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services, excluding supplies and equipment the DBE subcontractor purchases or leases from the prime contractor or its affiliate.
- G. The names of agencies contacted to provide assistance in contacting, recruiting and using DBE firms.
- H. Any additional data to support a demonstration of good faith efforts.

SECTION 3. AWARD AND EXECUTION OF CONTRACT

The bidder's attention is directed to the provisions in Section 3, "Award and Execution of Contract," of the Standard Specifications and these special provisions for the requirements and conditions concerning award and execution of contract.

The award of the contract, if it be awarded, will be to the lowest responsible bidder whose proposal complies with all the requirements prescribed and who has met the goal for DBE participation or has demonstrated, to the satisfaction of the Department, adequate good faith efforts to do so. Meeting the goal for DBE participation or demonstrating, to the satisfaction of the Department, adequate good faith efforts to do so is a condition for being eligible for award of contract.

If this proposal shall be accepted and the undersigned shall fail to enter into the contract and furnish the 2 bonds in the sums required by the State Contract Act, with surety satisfactory to the Department of Transportation, **within 4 days**, not including Saturdays, Sundays and legal holidays, after the bidder has received notice from the Department that the contract has been awarded, the Department of Transportation may, at its option, determine that the bidder has abandoned the contract, and thereupon this proposal and the acceptance thereof shall be null and void and the forfeiture of such security accompanying this proposal shall operate and the same shall be the property of the State of California.

A "Payee Data Record" form will be included in the contract documents to be executed by the successful bidder. The purpose of the form is to facilitate the collection of taxpayer identification data. The form shall be completed and returned to the Department by the successful bidder with the executed contract and contract bonds. For the purposes of the form, payee shall be deemed to mean the successful bidder. The form is not to be completed for subcontractors or suppliers. Failure to complete and return the "Payee Data Record" form to the Department as provided herein will result in the retention of 31 percent of payments due the contractor and penalties of up to \$20,000. This retention of payments for failure to complete the "Payee Data Record" form is in addition to any other retention of payments due the Contractor.

SECTION 4. BEGINNING OF WORK, TIME OF COMPLETION AND LIQUIDATED DAMAGES

Attention is directed to the provisions in Sections 8-1.03, "Beginning of Work," 8-1.06, "Time of Completion," 8-1.07, "Liquidated Damages," and 20-4.08, "Plant Establishment Work," of the Standard Specifications and these special provisions.

The Contractor shall begin work within 5 calendar days after the contract has been approved by the Attorney General or the attorney appointed and authorized to represent the Department of Transportation.

The work (except plant establishment) shall be diligently prosecuted to the completion before the expiration of 240 **WORKING DAYS** beginning on the fifteenth calendar day after approval of the contract.

The Contractor shall pay to the State of California the sum of \$14,400 per day, for each and every calendar day's delay in finishing the work (except plant establishment work) in excess of the number of working days prescribed above.

The Contractor shall diligently prosecute all work (including plant establishment) to completion before the expiration of 365 **WORKING DAYS** beginning on the fifteenth calendar day after approval of the contract.

The Contractor shall pay to the State of California the sum of \$600 per day, for each and every calendar day's delay in completing the work in excess of the number of working days prescribed above.

In no case will liquidated damages of more than \$14,400 per day be assessed.

SECTION 5. GENERAL

SECTION 5-1. MISCELLANEOUS

5-1.01 PLANS AND WORKING DRAWINGS

When the specifications require working drawings to be submitted to the Division of Structure Design, the drawings shall be submitted to: Division of Structure Design, Documents Unit, Mail Station 9, 1801 30th Street, Sacramento, CA 95816, Telephone (916) 227-8252.

5-1.011 EXAMINATION OF PLANS, SPECIFICATIONS, CONTRACT, AND SITE OF WORK

Attention is directed to "Differing Site Conditions" of these special provisions regarding physical conditions at the site which may differ from those indicated in "Materials Information," log of test borings or other geotechnical information obtained by the Department's investigation of site conditions.

5-1.012 DIFFERING SITE CONDITIONS

Attention is directed to Section 5-1.116, "Differing Site Conditions," of the Standard Specifications.

During the progress of the work, if subsurface or latent conditions are encountered at the site differing materially from those indicated in the "Materials Information," log of test borings, other geotechnical data obtained by the Department's investigation of subsurface conditions, or an examination of the conditions above ground at the site, the party discovering those conditions shall promptly notify the other party in writing of the specific differing conditions before they are disturbed and before the affected work is performed.

The Contractor will be allowed 15 days from the notification of the Engineer's determination of whether or not an adjustment of the contract is warranted, in which to file a notice of potential claim in conformance with the provisions of Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications and as specified herein; otherwise the decision of the Engineer shall be deemed to have been accepted by the Contractor as correct. The notice of potential claim shall set forth in what respects the Contractor's position differs from the Engineer's determination and provide any additional information obtained by the Contractor, including but not limited to additional geotechnical data. The notice of potential claim shall be accompanied by the Contractor's certification that the following were made in preparation of the bid: a review of the contract, a review of the "Materials Information," a review of the log of test borings and other records of geotechnical data to the extent they were made available to bidders prior to the opening of bids, and an examination of the conditions above ground at the site. Supplementary information, obtained by the Contractor subsequent to the filing of the notice of potential claim, shall be submitted to the Engineer in an expeditious manner.

5-1.013 LINES AND GRADES

Attention is directed to Section 5-1.07, "Lines and Grades," of the Standard Specifications.

Stakes or marks will be set by the Engineer in conformance with the requirements in Chapter 12, "Construction Surveys," of the Department's Surveys Manual.

5-1.015 LABORATORY

When a reference is made in the specifications to the "Laboratory," the reference shall mean Division of Engineering Services - Materials Engineering and Testing Services and Division of Engineering Services - Geotechnical Services of the Department of Transportation, or established laboratories of the various Districts of the Department, or other laboratories authorized by the Department to test materials and work involved in the contract. When a reference is made in the specifications to the "Transportation Laboratory," the reference shall mean Division of Engineering Services - Materials Engineering and Testing Services and Division of Engineering Services - Geotechnical Services, located at 5900 Folsom Boulevard, Sacramento, CA 95819, Telephone (916) 227-7000.

5-1.017 CONTRACT BONDS

Attention is directed to Section 3-1.02, "Contract Bonds," of the Standard Specifications and these special provisions.

The payment bond shall be in a sum not less than one hundred percent of the total amount payable by the terms of the contract.

5-1.019 COST REDUCTION INCENTIVE

Attention is directed to Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications.

Prior to preparing a written cost reduction proposal, the Contractor shall request a meeting with the Engineer to discuss the proposal in concept. Items of discussion will also include permit issues, impact on other projects, impact on the project schedule, peer reviews, overall merit of the proposal, and review times required by the Department and other agencies.

If a cost reduction proposal submitted by the Contractor, and subsequently approved by the Engineer, provides for a reduction in contract time, 50 percent of that contract time reduction shall be credited to the State by reducing the contract working days, not including plant establishment. Attention is directed to "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions regarding the working days.

If a cost reduction proposal submitted by the Contractor, and subsequently approved by the Engineer, provides for a reduction in traffic congestion or avoids traffic congestion during construction, 60 percent of the estimated net savings in construction costs attributable to the cost reduction proposal will be paid to the Contractor. In addition to the requirements in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications, the Contractor shall provide detailed comparisons of the traffic handling between the existing contract and the proposed change, and estimates of the traffic volumes and congestion.

5-1.02 LABOR NONDISCRIMINATION

Attention is directed to the following Notice that is required by Chapter 5 of Division 4 of Title 2, California Code of Regulations.

NOTICE OF REQUIREMENT FOR NONDISCRIMINATION PROGRAM

(GOV. CODE, SECTION 12990)

Your attention is called to the "Nondiscrimination Clause", set forth in Section 7-1.01A(4), "Labor Nondiscrimination," of the Standard Specifications, which is applicable to all nonexempt State contracts and subcontracts, and to the "Standard California Nondiscrimination Construction Contract Specifications" set forth therein. The specifications are applicable to all nonexempt State construction contracts and subcontracts of \$5000 or more.

5-1.022 PAYMENT OF WITHHELD FUNDS

Payment of withheld funds shall conform to Section 9-1.065, "Payment of Withheld Funds," of the Standard Specifications and these special provisions.

Funds withheld from progress payments to ensure performance of the contract that are eligible for payment into escrow or to an escrow agent pursuant to Section 10263 of the California Public Contract Code do not include funds withheld or deducted from payment due to failure of the Contractor to fulfill a contract requirement.

5-1.03 INTEREST ON PAYMENTS

Interest shall be payable on progress payments, payments after acceptance, final payments, extra work payments, and claim payments as follows:

- A. Unpaid progress payments, payment after acceptance, and final payments shall begin to accrue interest 30 days after the Engineer prepares the payment estimate.
- B. Unpaid extra work bills shall begin to accrue interest 30 days after preparation of the first pay estimate following receipt of a properly submitted and undisputed extra work bill. To be properly submitted, the bill must be submitted within 7 days of the performance of the extra work and in conformance with the provisions in Section 9-1.03C, "Records," and Section 9-1.06, "Partial Payments," of the Standard Specifications. An undisputed extra work bill not submitted within 7 days of performance of the extra work will begin to accrue interest 30 days after the preparation of the second pay estimate following submittal of the bill.
- C. The rate of interest payable for unpaid progress payments, payments after acceptance, final payments, and extra work payments shall be 10 percent per annum.
- D. The rate of interest payable on a claim, protest or dispute ultimately allowed under this contract shall be 6 percent per annum. Interest shall begin to accrue 61 days after the Contractor submits to the Engineer information in sufficient detail to enable the Engineer to ascertain the basis and amount of said claim, protest or dispute.

The rate of interest payable on any award in arbitration shall be 6 percent per annum if allowed under the provisions of Civil Code Section 3289.

5-1.031 FINAL PAYMENT AND CLAIMS

Attention is directed to Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications.

If the Contractor files a timely written statement of claims in response to the proposed final estimate, the District that administers the contract will submit a claim position letter to the Contractor by hand delivery or deposit in the U.S. mail within 135 days of acceptance of the contract. The claim position letter will delineate the District's position on the Contractor's claims. If the Contractor disagrees with the claim position letter, the Contractor shall submit a written notification of its disagreement to be received by the District not later than 15 days after the Contractor's receipt of the claim position letter. The written notification of disagreement shall set forth the basis for the Contractor's disagreement and be submitted to the office designated in the claim position letter. The Contractor's failure to provide a timely, written notification of disagreement shall constitute the Contractor's acceptance and agreement with the determinations provided in the claim position letter and with final payment pursuant to the claim position letter.

If the Contractor files a timely notification of disagreement with the District claim position letter, the board of review designated by the District Director to review claims that remain in dispute will meet with the Contractor within 45 days after receipt by the District of the notification of disagreement. Attendance by the Contractor at the board of review meeting shall be mandatory.

If the District fails to submit a claim position letter to the Contractor within 135 days after the acceptance of the contract and the Contractor has claims that remain in dispute, the Contractor may request a meeting with the board of review designated by the District Director to review claims that remain in dispute. The Contractor's request for a meeting shall identify the claims that remain in dispute. If the Contractor files a request for a meeting, the board of review will meet with the Contractor within 45 days after the District receives the request for the meeting. Attendance by the Contractor at the District Director's board of review meeting shall be mandatory.

Failure of the Contractor to file a timely written statement of claims in response to the proposed final estimate, or to file a timely notification of disagreement with the District claim position letter, or to attend the District Director's board of review meeting shall constitute a failure to pursue diligently and exhaust the administrative procedures in the contract and shall be a bar to arbitration in conformance with the requirements in Section 10240.2 of the California Public Contract Code.

5-1.04 PUBLIC SAFETY

The Contractor shall provide for the safety of traffic and the public in conformance with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications and these special provisions.

The Contractor shall install temporary railing (Type K) between a lane open to public traffic and an excavation, obstacle or storage area when the following conditions exist:

- A. Excavations.—The near edge of the excavation is 3.6 m or less from the edge of the lane, except:
 1. Excavations covered with sheet steel or concrete covers of adequate thickness to prevent accidental entry by traffic or the public.
 2. Excavations less than 0.3-m deep.
 3. Trenches less than 0.3-m wide for irrigation pipe or electrical conduit, or excavations less than 0.3-m in diameter.
 4. Excavations parallel to the lane for the purpose of pavement widening or reconstruction.
 5. Excavations in side slopes, where the slope is steeper than 1:4 (vertical:horizontal).
 6. Excavations protected by existing barrier or railing.
- B. Temporarily Unprotected Permanent Obstacles.—The work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and the Contractor elects to install the obstacle prior to installing the protective system; or the Contractor, for the Contractor's convenience and with permission of the Engineer, removes a portion of an existing protective railing at an obstacle and does not replace such railing complete in place during the same day.
- C. Storage Areas.—Material or equipment is stored within 3.6 m of the lane and the storage is not otherwise prohibited by the provisions of the Standard Specifications and these special provisions.

The approach end of temporary railing (Type K), installed in conformance with the provisions in this section "Public Safety" and in Section 7-1.09, "Public Safety," of the Standard Specifications, shall be offset a minimum of 4.6 m from the edge of the traffic lane open to public traffic. The temporary railing shall be installed on a skew toward the edge of the traffic lane of not more than 0.3-m transversely to 3 m longitudinally with respect to the edge of the traffic lane. If the 4.6-m minimum offset cannot be achieved, the temporary railing shall be installed on the 10 to 1 skew to obtain the maximum available offset between the approach end of the railing and the edge of the traffic lane, and an array of temporary crash cushion modules shall be installed at the approach end of the temporary railing.

Temporary railing (Type K) shall conform to the provisions in Section 12-3.08, "Temporary Railing (Type K)," of the Standard Specifications. Temporary railing (Type K), conforming to the details shown on 1999 Standard Plan T3, may be used. Temporary railing (Type K) fabricated prior to January 1, 1993, and conforming to 1988 Standard Plan B11-30 may be used, provided the fabrication date is printed on the required Certificate of Compliance.

Temporary crash cushion modules shall conform to the provisions in "Temporary Crash Cushion Module" of these special provisions.

Except for installing, maintaining and removing traffic control devices, whenever work is performed or equipment is operated in the following work areas, the Contractor shall close the adjacent traffic lane unless otherwise provided in the Standard Specifications and these special provisions:

Approach Speed of Public Traffic (Posted Limit) (Kilometers Per Hour)	Work Areas
Over 72 (45 Miles Per Hour)	Within 1.8 m of a traffic lane but not on a traffic lane
56 to 72 (35 to 45 Miles Per Hour)	Within 0.9-m of a traffic lane but not on a traffic lane

The lane closure provisions of this section shall not apply if the work area is protected by permanent or temporary railing or barrier.

When traffic cones or delineators are used to delineate a temporary edge of a traffic lane, the line of cones or delineators shall be considered to be the edge of the traffic lane, however, the Contractor shall not reduce the width of an existing lane to less than 3 m without written approval from the Engineer.

When work is not in progress on a trench or other excavation that required closure of an adjacent lane, the traffic cones or portable delineators used for the lane closure shall be placed off of and adjacent to the edge of the traveled way. The spacing of the cones or delineators shall be not more than the spacing used for the lane closure.

Suspended loads or equipment shall not be moved nor positioned over public traffic or pedestrians.

Full compensation for conforming to the provisions in this section "Public Safety," including furnishing and installing temporary railing (Type K) and temporary crash cushion modules, shall be considered as included in the contract prices paid for the various items of work involved and no additional compensation will be allowed therefor.

5-1.05 TESTING

Testing of materials and work shall conform to the provisions in Section 6-3, "Testing," of the Standard Specifications and these special provisions.

Whenever the provisions of Section 6-3.01, "General," of the Standard Specifications refer to tests or testing, it shall mean tests to assure the quality and to determine the acceptability of the materials and work.

The Engineer will deduct the costs for testing of materials and work found to be unacceptable, as determined by the tests performed by the Department, and the costs for testing of material sources identified by the Contractor which are not used for the work, from moneys due or to become due to the Contractor. The amount deducted will be determined by the Engineer.

5-1.06 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES

When the presence of asbestos or hazardous substances are not shown on the plans or indicated in the specifications and the Contractor encounters materials which the Contractor reasonably believes to be asbestos or a hazardous substance as defined in Section 25914.1 of the Health and Safety Code, and the asbestos or hazardous substance has not been rendered harmless, the Contractor may continue work in unaffected areas reasonably believed to be safe. The Contractor shall immediately cease work in the affected area and report the condition to the Engineer in writing.

In conformance with Section 25914.1 of the Health and Safety Code, removal of asbestos or hazardous substances including exploratory work to identify and determine the extent of the asbestos or hazardous substance will be performed by separate contract.

If delay of work in the area delays the current controlling operation, the delay will be considered a right of way delay and the Contractor will be compensated for the delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

5-1.07 YEAR 2000 COMPLIANCE

This contract is subject to Year 2000 Compliance for automated devices in the State of California.

Year 2000 compliance for automated devices in the State of California is achieved when embedded functions have or create no logical or mathematical inconsistencies when dealing with dates prior to and beyond 1999. The year 2000 is recognized and processed as a leap year. The product shall operate accurately in the manner in which the product was intended for date operation without requiring manual intervention.

The Contractor shall provide the Engineer a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for all automated devices furnished for the project.

5-1.075 BUY AMERICA REQUIREMENTS

Attention is directed to the "Buy America" requirements of the Surface Transportation Assistance Act of 1982 (Section 165) and the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) Sections 1041(a) and 1048(a), and the regulations adopted pursuant thereto. In conformance with the law and regulations, all manufacturing processes for steel and iron materials furnished for incorporation into the work on this project shall occur in the United States; with the exception that pig iron and processed, pelletized and reduced iron ore manufactured outside of the United States may be used in the domestic manufacturing process for such steel and iron materials. The application of coatings, such as epoxy coating, galvanizing, painting, and other coatings that protect or enhance the value of steel or iron materials shall be considered a manufacturing process subject to the "Buy America" requirements.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for steel and iron materials. The certificates, in addition to certifying that the materials comply with the specifications, shall specifically certify that all manufacturing processes for the materials occurred in the United States, except for the above exceptions.

The requirements imposed by the law and regulations do not prevent a minimal use of foreign steel and iron materials if the total combined cost of the materials used does not exceed one-tenth of one percent (0.1 percent) of the total contract cost or \$2500, whichever is greater. The Contractor shall furnish the Engineer acceptable documentation of the quantity and value of the foreign steel and iron prior to incorporating the materials into the work.

5-1.08 SUBCONTRACTOR AND DBE RECORDS

The Contractor shall maintain records showing the name and business address of each first-tier subcontractor. The records shall also show the name and business address of every DBE subcontractor, DBE vendor of materials and DBE trucking company, regardless of tier. The records shall show the date of payment and the total dollar figure paid to all of these firms. DBE prime contractors shall also show the date of work performed by their own forces along with the corresponding dollar value of the work.

Upon completion of the contract, a summary of these records shall be prepared on Form CEM-2402 (F) and certified correct by the Contractor or the Contractor's authorized representative, and shall be furnished to the Engineer. The form shall be furnished to the Engineer within 90 days from the date of contract acceptance. \$10,000 will be withheld from payment until the Form CEM-2402 (F) is submitted. The amount will be returned to the Contractor when a satisfactory Form CEM-2402 (F) is submitted.

Prior to the fifteenth of each month, the Contractor shall submit documentation to the Engineer showing the amount paid to DBE trucking companies listed in the Contractor's DBE information. This monthly documentation shall indicate the portion of the revenue paid to DBE trucking companies which is claimed toward DBE participation. The Contractor shall also obtain and submit documentation to the Engineer showing the amount paid by DBE trucking companies to all firms, including owner-operators, for the leasing of trucks. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement. The records must confirm that the amount of credit claimed toward DBE participation conforms with Section 2-1.02, "Disadvantaged Business Enterprise," of these special provisions.

The Contractor shall also obtain and submit documentation to the Engineer showing the truck number, owner's name, California Highway Patrol CA number, and if applicable, the DBE certification number of the owner of the truck for all trucks used during that month for which DBE participation will be claimed. This documentation shall be submitted on Form CEM-2404 (F).

5-1.083 DBE CERTIFICATION STATUS

If a DBE subcontractor is decertified during the life of the project, the decertified subcontractor shall notify the Contractor in writing with the date of decertification. If a subcontractor becomes a certified DBE during the life of the project, the subcontractor shall notify the Contractor in writing with the date of certification. The Contractor shall furnish the written documentation to the Engineer.

Upon completion of the contract, Form CEM-2403 (F) indicating the DBE's existing certification status shall be signed and certified correct by the Contractor. The certified form shall be furnished to the Engineer within 90 days from the date of contract acceptance.

5-1.086 PERFORMANCE OF DBE SUBCONTRACTORS AND SUPPLIERS

The DBEs listed by the Contractor in response to the provisions in Section 2-1.02B, "Submission of DBE Information," and Section 3, "Award and Execution of Contract," of these special provisions, which are determined by the Department to be certified DBEs, shall perform the work and supply the materials for which they are listed, unless the Contractor has received prior written authorization to perform the work with other forces or to obtain the materials from other sources.

Authorization to use other forces or sources of materials may be requested for the following reasons:

- A. The listed DBE, after having had a reasonable opportunity to do so, fails or refuses to execute a written contract, when such written contract, based upon the general terms, conditions, plans and specifications for the project, or on the terms of such subcontractor's or supplier's written bid, is presented by the Contractor.
- B. The listed DBE becomes bankrupt or insolvent.
- C. The listed DBE fails or refuses to perform the subcontract or furnish the listed materials.
- D. The Contractor stipulated that a bond was a condition of executing a subcontract and the listed DBE subcontractor fails or refuses to meet the bond requirements of the Contractor.
- E. The work performed by the listed subcontractor is substantially unsatisfactory and is not in substantial conformance with the plans and specifications, or the subcontractor is substantially delaying or disrupting the progress of the work.
- F. It would be in the best interest of the State.

The Contractor shall not be entitled to any payment for such work or material unless it is performed or supplied by the listed DBE or by other forces (including those of the Contractor) pursuant to prior written authorization of the Engineer.

5-1.09 SUBCONTRACTING

Attention is directed to the provisions in Section 8-1.01, "Subcontracting," of the Standard Specifications, and Section 2, "Proposal Requirements and Conditions," and Section 3, "Award and Execution of Contract," of these special provisions.

Pursuant to the provisions of Section 1777.1 of the Labor Code, the Labor Commissioner publishes and distributes a list of contractors ineligible to perform work as a subcontractor on a public works project. This list of debarred contractors is available from the Department of Industrial Relations web site at:

<http://www.dir.ca.gov/DLSE/Debar.html>.

The provisions in the third paragraph of Section 8-1.01, "Subcontracting," of the Standard Specifications, that the Contractor shall perform with the Contractor's own organization contract work amounting to not less than 50 percent of the original contract price, is not changed by the Federal Aid requirement specified under "Required Contract Provisions Federal-Aid Construction Contracts" in Section 14 of these special provisions that the Contractor perform not less than 30 percent of the original contract work with the Contractor's own organization.

Each subcontract and any lower tier subcontract that may in turn be made shall include the "Required Contract Provisions Federal-Aid Construction Contracts" in Section 14 of these special provisions. This requirement shall be enforced as follows:

- A. Noncompliance shall be corrected. Payment for subcontracted work involved will be withheld from progress payments due, or to become due, until correction is made. Failure to comply may result in termination of the contract.

In conformance with the Federal DBE regulations Sections 26.53(f)(1) and 26.53(f)(2) Part 26, Title 49 CFR:

- A. The Contractor shall not terminate for convenience a DBE subcontractor listed in response to Section 2-1.02B, "Submission of DBE Information," and then perform that work with its own forces, or those of an affiliate without the written consent of the Department, and
- B. If a DBE subcontractor is terminated or fails to complete its work for any reason, the Contractor will be required to make good faith efforts to substitute another DBE subcontractor for the original DBE subcontractor, to the extent needed to meet the contract goal.

The requirement in Section 2-1.02, "Disadvantaged Business Enterprise (DBE)," of these special provisions that DBEs must be certified on the date bids are opened does not apply to DBE substitutions after award of the contract.

5-1.10 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS

Attention is directed to the provisions in Sections 10262 and 10262.5 of the Public Contract Code and Section 7108.5 of the Business and Professions Code concerning prompt payment to subcontractors.

5-1.102 PROMPT PAYMENT OF WITHHELD FUNDS TO SUBCONTRACTORS

The Contractor shall return all moneys withheld in retention from the subcontractor within 30 days after receiving payment for work satisfactorily completed, even if the other contract work is not completed and has not been accepted in conformance with Section 7-1.17, "Acceptance of Contract," of the Standard Specifications. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to the Contractor or subcontractor in the event of a dispute involving late payment or nonpayment by the Contractor or deficient subcontract performance or noncompliance by a subcontractor.

5-1.103 RECORDS

The Contractor shall maintain cost accounting records for the contract pertaining to, and in such a manner as to provide a clear distinction between, the following six categories of costs of work during the life of the contract:

- A. Direct costs of contract item work.
- B. Direct costs of changes in character in conformance with Section 4-1.03C, "Changes in Character of Work," of the Standard Specifications.
- C. Direct costs of extra work in conformance with Section 4-1.03D, "Extra Work," of the Standard Specifications.
- D. Direct costs of work not required by the contract and performed for others.
- E. Direct costs of work performed under a notice of potential claim in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications.
- F. Indirect costs of overhead.

Cost accounting records shall include the information specified for daily extra work reports in Section 9-1.03C, "Records," of the Standard Specifications. The requirements for furnishing the Engineer completed daily extra work reports shall only apply to work paid for on a force account basis.

The cost accounting records for the contract shall be maintained separately from other contracts, during the life of the contract, and for a period of not less than 3 years after the date of acceptance of the contract. If the Contractor intends to file claims against the Department, the Contractor shall keep the cost accounting records specified above until complete resolution of all claims has been reached.

5-1.11 PARTNERING

The State will promote the formation of a "Partnering" relationship with the Contractor in order to effectively complete the contract to the benefit of both parties. The purpose of this relationship is to maintain a cooperative communication and to mutually resolve conflicts at the lowest responsible management level.

The Contractor may request the formation of a "Partnering" relationship by submitting a request in writing to the Engineer after approval of the contract. If the Contractor's request for "Partnering" is approved by the Engineer, scheduling of a "Partnering Workshop," selecting the "Partnering" facilitator and workshop site, and other administrative details shall be as agreed to by both parties. If agreed to by the parties, additional "Partnering Workshops" will be conducted as needed throughout the life of the contract.

The costs involved in providing the "Partnering Workshop" facilitator and workshop site will be borne equally by the State and the Contractor. The division of cost will be made by determining the cost in providing the "Partnering Workshop" facilitator and workshop site in conformance with the provisions in Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the Standard Specifications, and paying to the Contractor one-half of that cost, except no markups will be allowed.

All other costs associated with "Partnering Workshops" will be borne separately by the party incurring the costs, such as wages and travel expenses, and no additional compensation will be allowed therefor.

The establishment of a "Partnering" relationship will not change or modify the terms and conditions of the contract and will not relieve either party of the legal requirements of the contract.

5-1.114 VALUE ANALYSIS

The Contractor may submit to the Engineer, in writing, a request for a "Value Analysis" workshop. The purpose for having a workshop is to identify value enhancing opportunities and to consider modifications to the plans and specifications that will reduce either the total cost, time of construction or traffic congestion, without impairing, in any manner, the essential functions or characteristics of the project including, but not limited to, service life, economy of operation, ease of maintenance, benefits to the travelling public, desired appearance, or design and safety standards.

To maximize the potential benefits of a workshop, the request should be submitted to the Engineer early in the project after approval of the contract. If the Contractor's request for a "Value Analysis" workshop is approved by the Engineer, scheduling of a workshop, selecting the facilitator and workshop site, and other administrative details shall be determined cooperatively by the Contractor and the Engineer.

The workshop shall be conducted in conformance with the methodology described in the Department's "Value Analysis Team Guide" available at the Department's web site at:

<http://www.dot.ca.gov/hq/oppd/value/>

The facilitator shall be a Certified Value Specialist (CVS) as recognized by the Society of American Value Engineers (SAVE) International, which may be contacted as follows:

SAVE International, 60 Revere Drive, Northbrook, IL 60062
Telephone 1-847-480-1730, FAX 1-847-480-9282

The Contractor may submit recommendations resulting from a "Value Analysis" workshop for approval by the Engineer as cost reduction incentive proposals in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications.

The costs involved in providing the "Value Analysis" facilitator and workshop site will be borne equally by the State and the Contractor. The division of cost will be made by determining the cost in providing the "Value Analysis" facilitator and workshop site in conformance with the provisions in Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the Standard Specifications, and paying to the Contractor one-half of that cost, except no markups will be allowed.

All other costs associated with the "Value Analysis" workshop will be borne separately by the party incurring the costs, such as wages and travel expenses, and no additional compensation will be allowed therefor.

5-1.12 DISPUTE REVIEW BOARD

GENERAL

To assist in the resolution of disputes or potential claims arising out of the work of this project, a Dispute Review Board, hereinafter referred to as the "DRB," shall be established by the Engineer and Contractor cooperatively upon approval of the contract. The DRB is intended to assist the contract administrative claims resolution process as specified in the provisions in Section 9-1.04, "Notice of Potential Claim," and Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications and these special provisions. The DRB shall not serve as a substitute for provisions in the specifications in regard to filing potential claims. The requirements and procedures established in this section shall be a prerequisite to filing a claim, filing for arbitration, or filing for litigation prior or subsequent to project completion.

The DRB shall be utilized when dispute or potential claim resolution at the project level is unsuccessful. The DRB shall function as specified herein until the day of acceptance of the contract, at which time the work of the DRB will cease except for completion of unfinished reports. No dispute meetings shall take place later than 30 days prior to acceptance of contract. After acceptance of contract, disputes or potential claims which have followed the dispute resolution processes of the Standard Specifications and these special provisions, but have not been resolved, shall be stated or restated by the Contractor, in response to the Proposed Final Estimate within the time limits provided in Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications and these special provisions. The State will review those claims in conformance with the provisions in Section 9-1.07B of the Standard Specifications and these special provisions. Following the adherence to and completion of the State's administrative claims procedure, the Contractor may file for arbitration in conformance with the provisions in Section 9-1.10, "Arbitration," of the Standard Specifications and these special provisions.

Disputes, as used in this section, shall include differences of opinion, properly noticed as provided hereinafter, between the State and Contractor on matters related to the work and other subjects considered by the State or Contractor, or by both, to be of concern to the DRB on this project, except matters relating to Contractor, subcontractor or supplier potential claims not actionable against the State as specified in these special provisions. Whenever the term "dispute" or "disputes" is used herein, it shall be deemed to include potential claims as well as disputes.

The DRB shall serve as an advisory body to assist in the resolution of disputes between the State and the Contractor, hereinafter referred to as the "parties." The DRB shall consider disputes referred to it, and furnish written reports containing findings and recommendations pertaining to those disputes, to the parties to aid in resolution of the differences between them. DRB findings and recommendations are not binding on the parties.

SELECTION PROCESS, DISCLOSURE AND APPOINTMENTS

The DRB shall consist of one member selected by the State and approved by the Contractor, one member selected by the Contractor and approved by the State, and a third member selected by the first 2 members and approved by both the State and the Contractor. The third member shall act as the DRB Chairperson.

DRB members shall be especially knowledgeable in the type of construction and contract documents potentially anticipated by the contract. DRB members shall discharge their responsibilities impartially as an independent body, considering the facts and circumstances related to the matters under consideration, applicable laws and regulations, and the pertinent provisions of the contract.

The State and the Contractor shall nominate and approve DRB members in conformance with the terms and conditions of the Dispute Review Board Agreement and these special provisions, within 45 days of the approval of the contract. Each party shall provide written notification to the other of the name of their selected DRB nominee along with the prospective member's written disclosure statement.

Prior to finalizing DRB appointments, the first 2 prospective DRB members shall submit complete disclosure statements to both the State and the Contractor. Disclosure statements shall include a resume of the prospective member's experience and a declaration statement describing past, present, anticipated, and planned relationships, including indirect relationships through the prospective member's primary or full-time employer, to this project and with the parties involved in this construction contract, including but not limited to, relevant subcontractors or suppliers to the parties, parties' principals, or parties' counsel. DRB members shall also include a full disclosure of close professional or personal relationships with all key members of the contract. Objections to nominees must be based on a specific breach or violation of nominee responsibilities or on nominee qualifications under these provisions unless otherwise specified. The Contractor or the State may, on a one-time basis, object to the other's nominee without specifying a reason and this person will not be selected for the DRB. Another person shall then be nominated within 15 days.

The first duty of the State and Contractor selected members of the DRB shall be to select and recommend a prospective third DRB member to the parties for final selection and approval. The first 2 DRB members shall proceed with the selection of the third DRB member immediately upon receiving written notification from the State of their selection, and shall provide their recommendation simultaneously to the parties within 15 days of the notification.

The first 2 DRB members shall select a third DRB member subject to mutual approval of the parties or may mutually concur on a list of potentially acceptable third DRB members and submit the list to the parties for final selection and approval of the third member. The goal in the selection of the third member is to complement the professional experience of the first 2 members and to provide leadership for the DRB's activities.

The third prospective DRB member shall supply a full disclosure statement to the first 2 DRB members and to the parties prior to appointment.

An impasse shall be considered to have been reached if the parties are unable to approve a third member within 15 days of receipt of the recommendation of the first 2 DRB members, or if the first 2 DRB members are unable to agree upon a recommendation within their 15 day time limit. In the event of an impasse in selection of third DRB member the State and the Contractor shall each propose 3 candidates for the third DRB member position. The parties shall select the candidates proposed under this paragraph from the current list of arbitrators certified by the Public Works Contract Arbitration Committee created by Article 7.2 (commencing with Section 10245) of the State Contract Act. The first 2 DRB members shall then select one of the 6 proposed candidates in a blind draw.

No DRB member shall have prior direct involvement in this contract. No member shall have a financial interest in this contract or the parties thereto, within a period of 6 months prior to award of this contract or during the contract, except as follows:

- A. Compensation for services on this DRB.
- B. Ownership interest in a party or parties, documented by the prospective DRB member, that has been reviewed and determined in writing by the State to be sufficiently insignificant to render the prospective member acceptable to the State.
- C. Service as a member of other Dispute Review Boards on other contracts.
- D. Retirement payments or pensions received from a party that are not tied to, dependent on or affected by the net worth of the party.
- E. The above provisions apply to parties having a financial interest in this contract, including but not limited to contractors, subcontractors, suppliers, consultants, and legal and business services.

The Contractor or the State may reject any of the three DRB members who fail to fully comply at all times with all required employment and financial disclosure conditions of DRB membership as described in the Dispute Review Board Agreement and as specified herein. A copy of the Dispute Review Board Agreement is included in this section.

The Contractor, the State, and the 3 members of the DRB shall complete and adhere to the Dispute Review Board Agreement in administration of this DRB within 15 days of the parties' concurrence in the selection of the third member. No DRB meeting shall take place until the Dispute Review Board Agreement has been signed by all parties. The State authorizes the Engineer to execute and administer the terms of the Agreement. The person(s) designated by the Contractor as authorized to execute contract change orders shall be authorized to execute and administer the terms of this agreement, or to delegate the authority in writing. The operation of the DRB shall be in conformance with the terms of the Dispute Review Board Agreement.

COMPENSATION

The State and the Contractor shall bear the costs and expenses of the DRB equally. Each DRB member shall be compensated at an agreed rate of \$1,200 per day if time spent per meeting, including on-site time plus one hour of travel time, is greater than 4 hours. Each DRB member shall be compensated at an agreed rate of \$700 per day if time spent per meeting, including on-site time plus one hour of travel time, is less than or equal to 4 hours. The agreed rates shall be considered full compensation for on-site time, travel expenses, transportation, lodging, time for travel and incidentals for each day, or portion thereof, that the DRB member is at an authorized DRB meeting. No additional compensation will be made for time spent by DRB members in review and research activities outside the official DRB meetings unless that time, (such as time spent evaluating and preparing recommendations on specific issues presented to the DRB), has been specifically agreed to in advance by the State and Contractor. Time away from the project, which has been specifically agreed to in advance by the parties, will be compensated at an agreed rate of \$125 per hour. The agreed amount of \$125 per hour shall include all incidentals including expenses for telephone, fax, and computer services. Members serving on more than one DRB involving the Department, regardless of the number of meetings per day, shall not be paid more than the all inclusive rate per day or rate per hour for an individual project. The State will provide, at no cost to the Contractor, administrative services such as conference facilities and secretarial services to the DRB. These special provisions and the Dispute Review Board Agreement state the provisions for compensation and expenses of the DRB. DRB members shall be compensated at the same daily and hourly rate. The Contractor shall make direct payments to each DRB member for their participation in authorized meetings and approved hourly rate charges from invoices submitted by each DRB member. The State will reimburse the Contractor for its share of the costs. There will be no markups applied to expenses connected with the DRB, either by the DRB members or by the Contractor when requesting payment of the State's share of DRB expenses. Regardless of the DRB recommendation, neither party shall be entitled to reimbursement of DRB costs from the other party.

OF DRB MEMBERS

Service of a DRB member may be terminated at any time with not less than 15 days notice as follows:

- A. The State may terminate service of the State appointed member.
- B. The Contractor may terminate service of the Contractor appointed member.
- C. Upon the written recommendation of the State and Contractor members for the removal of the third member.
- D. Upon resignation of a member.
- E. The State or Contractor may terminate the service of any member who fails to fully comply with all required employment and financial disclosure conditions of DRB membership

When a member of the DRB is replaced, the replacement member shall be appointed in the same manner as the replaced member was appointed. The appointment of a replacement DRB member will begin promptly upon determination of the need for replacement and shall be completed within 15 days. Changes in either of the DRB members chosen by the two parties will not require re-selection of the third member, unless both parties agree to such re-selection in writing. The Dispute Review Board Agreement shall be amended to reflect the change of a DRB member.

OPERATION

The following procedure shall be used for dispute resolution:

- A. If the Contractor objects to any decision, act or order of the Engineer, the Contractor shall give written notice of potential claim in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications and these special provisions, including the provision of applicable cost documentation; or file written protests or notices in conformance with the provisions in the Standard Specifications and these special provisions.
- B. The Engineer will respond, in writing, to the Contractor's written protest or notice within 15 days of receipt of the written protest or notice.
- C. Within 15 days after receipt of the Engineer's written response, the Contractor shall, if the Contractor still objects, file a written reply with the Engineer, stating clearly and in detail the basis of the objection.
- D. Following the Contractor's objection to the Engineer's decision, the Contractor shall refer the dispute to the DRB if the Contractor wishes to further pursue the objection to the Engineer's decision. The Contractor shall make the referral in writing to the DRB, simultaneously copied to the State, within 21 days after receipt of the written reply from the Engineer. The written dispute referral shall describe the disputed matter in individual discrete segments so that it will be clear to both parties and the DRB what discrete elements of the dispute have been resolved, and which remain unresolved, and shall include an estimate of the cost of the affected work and impacts, if any, on project completion.
- E. By failing to submit the written notice of referral to the DRB, within 21 days after receipt of the State's written reply, the Contractor waives future claims and arbitration on the matter in contention.
- F. The Contractor and the State shall each be afforded an opportunity to be present and to be heard by the DRB, and to offer evidence. Either party furnishing written evidence or documentation to the DRB must furnish copies of such information to the other party a minimum of 15 days prior to the date the DRB is scheduled to convene the meeting for the dispute. Either party shall produce such additional evidence as the DRB may deem necessary to reach an understanding and a determination of the dispute. The party furnishing additional evidence shall furnish copies of such additional evidence to the other party at the same time the evidence is provided to the DRB. The DRB will not consider evidence not furnished in conformance with the terms specified herein.
- G. Upon receipt by the DRB of a written referral of a dispute, the DRB shall convene to review and consider the dispute. The dispute meeting shall be held no earlier than 30 days and no later than 60 days after receipt of the written referral unless otherwise agreed to by all parties. The DRB shall determine the time and location of the DRB meeting, with due consideration for the needs and preferences of the parties while recognizing the paramount importance of a speedy resolution of the dispute.
- H. There shall be no participation of either party's attorneys at DRB meetings.
- I. There shall be no participation of persons who are not directly involved in the contract or who do not have direct knowledge of the dispute, including but not limited to consultants, except for expert testimony allowed at the discretion of the DRB and with approval prior to the dispute meeting by both parties.

- J. The DRB shall furnish a report, containing findings and recommendations as described in the Dispute Review Board Agreement, in writing to both the State and the Contractor. The DRB may request clarifying information of either party within 10 days after the DRB dispute meeting. Requested information shall be submitted to the DRB within 10 days of the DRB request. The DRB shall complete its report, including minority opinion, if any, and submit it to the parties within 30 days of the DRB dispute meeting, except that time extensions may be granted at the request of the DRB with the written concurrence of both parties. The report shall include the facts and circumstances related to the matters under consideration, applicable laws and regulations, the pertinent provisions of the contract and the actual costs and time incurred as shown on the Contractor's cost accounting records. The DRB shall make recommendations on the merit of the dispute and, if appropriate, recommend guidelines for determining compensation.
- K. Within 30 days after receiving the DRB's report, both the State and the Contractor shall respond to the DRB in writing signifying that the dispute is either resolved or remains unresolved. Failure to provide the written response within the time specified, or a written rejection of the DRB's recommendation or response to a request for reconsideration presented in the report by either party, shall conclusively indicate that the party(s) failing to respond accepts the DRB recommendation. Immediately after responses have been received by both parties, the DRB will provide copies of both responses to the parties simultaneously. Either party may request clarification of elements of the DRB's report from the DRB prior to responding to the report. The DRB will consider any clarification request only if submitted within 10 days of receipt of the DRB's report, and if submitted simultaneously in writing to both the DRB and the other party. Each party may submit only one request for clarification for any individual DRB report. The DRB shall respond, in writing, to requests for clarification within 10 days of receipt of such requests.
- L. The DRB's recommendations, stated in the DRB's reports, are not binding on either party. Either party may seek a reconsideration of a recommendation of the DRB. The DRB shall only grant a reconsideration based upon submission of new evidence and if the request is submitted within the 30-day time limit specified for response to the DRB's written report. Each party may submit only one request for reconsideration regarding an individual DRB recommendation.
- M. If the State and the Contractor are able to resolve their dispute with the aid of the DRB's report, the State and Contractor shall promptly accept and implement the recommendations of the DRB. If the parties cannot agree on compensation within 60 days of the acceptance by both parties of the DRB's recommendation, either party may request the DRB to make a recommendation regarding compensation.
- N. The State or the Contractor shall not call DRB members who served on the DRB for this contract as witnesses in arbitration proceedings which may arise from this contract, and all documents created by the DRB shall be inadmissible as evidence in subsequent arbitration proceedings, except the DRB's final written reports on each issue brought before it.
- O. The State and Contractor shall jointly indemnify and hold harmless the DRB members from and against all claims, damages, losses, and expenses, including but not limited to attorney's fees, arising out of and resulting from the findings and recommendations of the DRB.
- P. The DRB members shall have no claim against the State or the Contractor, or both, from claimed harm arising out of the parties' evaluations of the DRB's report.

DISPUTES INVOLVING SUBCONTRACTOR POTENTIAL CLAIMS

For purposes of this section, a "subcontractor potential claim" shall include any potential claim by a subcontractor (including also any pass through potential claims by a lower tier subcontractor or supplier) against the Contractor that is actionable by the Contractor against the Department which arises from the work, services, or materials provided or to be provided in connection with the contract. If the Contractor determines to pursue a dispute against the Department that includes a subcontractor potential claim, the dispute shall be processed and resolved in conformance with these special provisions and in conformance with the following:

- A. The Contractor shall identify clearly in submissions pursuant to this section, that portion of the dispute that involves a subcontractor potential claim or potential claims.
- B. The Contractor shall include, as part of its submission pursuant to Step D above, a certification (False Claims Act Certification) by the subcontractor's or supplier's officer, partner, or authorized representative with authority to bind the subcontractor and with direct knowledge of the facts underlying the subcontractor potential claim. The Contractor shall submit a certification that the subcontractor potential claim is acknowledged and forwarded by the Contractor. The form for these certifications is available from the Engineer.
- C. At any DRB meeting on a dispute that includes one or more subcontractor potential claims, the Contractor shall require that each subcontractor that is involved in the dispute have present an authorized representative with actual knowledge of the facts underlying the subcontractor potential claim to assist in presenting the subcontractor potential claim and to answer questions raised by the DRB members or the Department's representatives.

- D. Failure by the Contractor to declare a subcontractor potential claim on behalf of its subcontractor (including lower tier subcontractors' and suppliers' pass through potential claims) at the time of submission of the Contractor's potential claims, as provided hereunder, shall constitute a release of the Department by the Contractor on account of such subcontractor potential claim.
- E. The Contractor shall include in all subcontracts under this contract that subcontractors and suppliers of any tier (a) agree to submit subcontractor potential claims to the Contractor in a proper form and in sufficient time to allow processing by the Contractor in conformance with the Dispute Review Board resolution specifications; (b) agree to be bound by the terms of the Dispute Review Board provisions to the extent applicable to subcontractor potential claims; (c) agree that, to the extent a subcontractor potential claim is involved, completion of all steps required under these Dispute Review Board special provisions shall be a condition precedent to pursuit by the subcontractor of other remedies permitted by law, including without limitation of a lawsuit against the Contractor; and (d) agree that the existence of a dispute resolution process for disputes involving subcontractor potential claims shall not be deemed to create any claim, right, or cause of action by any subcontractor or supplier against the Department.

Notwithstanding the foregoing, this Dispute Review Board special provision shall not apply to, and the DRB shall not have the authority to consider, subcontractor potential claims between the subcontractor(s) or supplier(s) and the Contractor that are not actionable by the Contractor against the Department.

RETENTION

Failure of the Contractor to nominate and approve DRB members in conformance with the terms and conditions of the Dispute Review Board Agreement and these special provisions shall result in the retention of 25 percent of the estimated value of all work performed during each estimate period in which the Contractor fails to comply with the requirements of this section as determined by the Engineer. DRB retentions will be released for payment on the next monthly estimate for partial payment following the date that the Contractor has nominated and approved DRB members and no interest will be due the Contractor.

DISPUTE REVIEW BOARD AGREEMENT

A copy of the "Dispute Review Board Agreement" to be executed by the Contractor, State and the 3 DRB members after approval of the contract follows:

DISPUTE REVIEW BOARD AGREEMENT

(Contract Identification)

Contract No. _____

THIS DISPUTE REVIEW BOARD AGREEMENT, hereinafter called "AGREEMENT", made and entered into this _____ day of _____, _____, between the State of California, acting through the California Department of Transportation and the Director of Transportation, hereinafter called the "STATE," _____ hereinafter called the "CONTRACTOR," and the Dispute Review Board, hereinafter called the "DRB" consisting of the following members:

_____,
(Contractor Appointee)

_____,
(State Appointee)

and _____
(Third Person)

WITNESSETH, that

WHEREAS, the STATE and the CONTRACTOR, hereinafter called the "parties," are now engaged in the construction on the State Highway project referenced above; and

WHEREAS, the special provisions for the above referenced contract provides for the establishment and operation of the DRB to assist in resolving disputes; and

WHEREAS, the DRB is composed of three members, one selected by the STATE, one selected by the CONTRACTOR, and the third member selected by the other two members and approved by the parties;

NOW THEREFORE, in consideration of the terms, conditions, covenants, and performance contained herein, or attached and incorporated and made a part hereof, the STATE, the CONTRACTOR, and the DRB members hereto agree as follows:

SECTION I DESCRIPTION OF WORK

To assist in the resolution of disputes between the parties, the contract provides for the establishment and the operation of the DRB. The intent of the DRB is to fairly and impartially consider disputes placed before it and provide written recommendations for resolution of these disputes to both parties. The members of this DRB shall perform the services necessary to participate in the DRB's actions as designated in Section II, Scope of Work.

SECTION II SCOPE OF WORK

The scope of work of the DRB includes, but is not limited to, the following:

A. OBJECTIVE

The principal objective of the DRB is to assist in the timely resolution of disputes between the parties arising from performance of this contract. It is not intended for either party to default on their normal responsibility to amicably and fairly settle their differences by indiscriminately assigning them to the DRB. It is intended that the mere existence of the DRB will encourage the parties to resolve disputes without resorting to this review procedure. But when a dispute that is serious enough to warrant the DRB's review does develop, the process for prompt and efficient action will be in place.

B. PROCEDURES

The DRB shall render written reports on disputes between the parties arising from the construction contract. Prior to consideration of a dispute, the DRB shall establish rules and regulations that will govern the conduct of its business and reporting procedures in conformance with the requirements of the contract and the terms of this AGREEMENT. DRB recommendations, resulting from its consideration of a dispute, shall be furnished in writing to both parties. The recommendations shall be based on the pertinent contract provisions, and the facts and circumstances involved in the dispute. The recommendations shall find one responsible party in a dispute; shared or "jury" determinations shall not be rendered. The DRB shall make recommendations on the merit of the dispute, and if appropriate, recommend guidelines for determining compensation. If the parties cannot agree on compensation within 60 days of the acceptance by both parties of the DRB's recommendation, either party may request the DRB to make a recommendation regarding compensation.

The DRB shall refrain from officially giving advice or consulting services to anyone involved in the contract. The individual members shall act in a completely independent manner and while serving as members of the DRB shall have no consulting business connections with either party or its principals or attorneys or other affiliates (subcontractors, suppliers, etc.) who have a beneficial interest in the contract.

During scheduled meetings of the DRB as well as during dispute meetings, DRB members shall refrain from expressing opinions on the merits of statements on matters under dispute or potential dispute. Opinions of DRB members expressed in private sessions shall be kept strictly confidential. Individual DRB members shall not meet with, or discuss contract issues with individual parties, except as directed by the DRB Chairperson. Such discussions or meetings shall be disclosed to both parties. Other discussions regarding the project between the DRB members and the parties shall be in the presence of all three members and both parties. Individual DRB members shall not undertake independent investigations of any kind pertaining to disputes or potential disputes, except with the knowledge of both parties and as expressly directed by the DRB Chairperson.

C. CONSTRUCTION SITE VISITS, PROGRESS MEETINGS AND FIELD INSPECTIONS

The DRB members shall visit the project site and meet with representatives of the parties to keep abreast of construction activities and to develop familiarity with the work in progress. Scheduled progress meetings shall be held at or near the project site. The DRB shall meet at least once at the start of the project, and at least once every 4 months thereafter. The frequency, exact time, and duration of additional site visits and progress meetings shall be as recommended by the DRB and approved by the parties consistent with the construction activities or matters under consideration and dispute. Each meeting shall consist of a round table discussion and a field inspection of the work being performed on the contract, if necessary. Each meeting shall be attended by representatives of both parties. The agenda shall generally be as follows:

1. Meeting opened by the DRB Chairperson.
2. Remarks by the STATE's representative.
3. A description by the CONTRACTOR's representative of work accomplished since the last meeting; the current schedule status of the work; and a forecast for the coming period.
4. An outline by the CONTRACTOR's representative of potential problems and a description of proposed solutions.
5. An outline by the STATE's representative of the status of the work as the STATE views it.
6. A brief description by the CONTRACTOR's or STATE's representative of potential claims or disputes which have surfaced since the last meeting.
7. A summary by the STATE's representative, the CONTRACTOR's representative, or the DRB of the status of past disputes and potential claims.

The STATE's representative will prepare minutes of all progress meetings and circulate them for revision and approval by all concerned within 10 days of the meeting.

The field inspection shall cover all active segments of the work, the DRB being accompanied by both parties' representatives. The field inspection may be waived upon mutual agreement of the parties.

D. DRB CONSIDERATION AND HANDLING OF DISPUTES

Upon receipt by the DRB of a written referral of a dispute, the DRB shall convene to review and consider the dispute. The dispute meeting shall be held no earlier than 30 days and no later than 60 days after receipt of the written referral, unless otherwise agreed to by all parties. The DRB shall determine the time and location of DRB dispute meetings, with due consideration for the needs and preferences of the parties while recognizing the paramount importance of speedy resolution of issues. No dispute meetings shall take place later than 30 days prior to acceptance of contract.

Normally, dispute meetings shall be conducted at or near the project site. However, any location that would be more convenient and still provide required facilities and access to necessary documentation shall be satisfactory.

Both parties shall be given the opportunity to present their evidence at these dispute meetings. It is expressly understood that the DRB members are to act impartially and independently in the consideration of the contract provisions, and the facts and conditions surrounding any dispute presented by either party, and that the recommendations concerning any such dispute are advisory and nonbinding on the parties.

The DRB may request that written documentation and arguments from both parties be sent to each DRB member, through the DRB Chairperson, for review before the dispute meeting begins. A party furnishing written documentation to the DRB shall furnish copies of such information to the other party at the same time that such information is supplied to the DRB.

DRB dispute meetings shall be informal. There shall be no testimony under oath or cross-examination. There shall be no reporting of the procedures by a shorthand reporter or by electronic means. Documents and verbal statements shall be received by the DRB in conformance with acceptance standards established by the DRB. These standards need not comply with prescribed legal laws of evidence.

The third DRB member shall act as Chairperson for dispute meetings and all other DRB activities. The parties shall have a representative at all dispute meetings. Failure to attend a duly noticed meeting by either of the parties shall be conclusively considered by the DRB as indication that the non-attending party considers written submittals as their entire and complete argument. The claimant shall discuss the dispute, followed by the other party. Each party shall then be allowed one or more rebuttals until all aspects of the dispute are thoroughly covered. DRB members shall ask questions, seek clarification, and request further data from either of the parties as may be necessary to assist in making a fully informed recommendation. The DRB may request from either party documents or information that would assist the DRB in making its findings and recommendations including, but not limited to, documents used by the CONTRACTOR in preparing the bid for the project. A refusal by a party to provide information requested by the DRB may be considered by the DRB as an indication that the requested material would tend to disprove that party's position. In large or complex cases, additional dispute meetings may be necessary in order to consider all the evidence presented by both parties. All involved parties shall maintain the confidentiality of all documents and information, as provided in this AGREEMENT.

During dispute meetings, no DRB member shall express an opinion concerning the merit of any facet of the case. DRB deliberations shall be conducted in private, with interim individual views kept strictly confidential.

After dispute meetings are concluded, the DRB shall meet in private and reach a conclusion supported by 2 or more members. Private sessions of the DRB may be held at a location other than the job site or by electronic conferencing as deemed appropriate, in order to expedite the process.

The DRB's findings and recommendations, along with discussion of reasons therefor, shall then be submitted as a written report to both parties. Recommendations shall be based on the pertinent contract provisions, applicable laws and regulations, and facts and circumstances related to the dispute. The report shall be thorough in discussing the facts considered, the contract language, law or regulation viewed by the DRB as pertinent to the issues, and the DRB's interpretation and philosophy in arriving at its conclusions and recommendations. The DRB's report shall stand on its own, without attachments or appendices. The DRB Chairperson shall complete and furnish a completed "Summary of Dispute Review Board Recommendation" form along with a copy of the written recommendation report to the DRB Coordinator, Division of Construction, MS 44, P.O. Box 942874, Sacramento, CA 94274. The "Summary of Dispute Review Board Recommendation" form is available through the Engineer.

With prior written approval of both parties, the DRB may obtain technical services necessary to adequately review the disputes presented, including audit, geotechnical, schedule analysis and other services. The parties' technical staff may supply those services as appropriate. The cost of technical services, as agreed to by the parties, shall be borne equally by the 2 parties as specified in an approved contract change order. The CONTRACTOR will not be entitled to markups for the payments made for these services.

The DRB shall resist submittal of incremental portions of information by either party, in the interest of making a fully informed decision and recommendation.

The DRB shall make every effort to reach a unanimous decision. If this proves impossible, the dissenting member shall prepare a minority opinion, which shall be included in the DRB's report.

Although both parties should place weight upon the DRB's recommendations, they are not binding. Either party may appeal a recommendation to the DRB for reconsideration. However, reconsideration shall only be allowed when there is new evidence to present, and the DRB shall accept only one appeal from each party pertaining to an individual DRB recommendation. The DRB shall hear appeals in conformance with the terms described in the Section entitled "Dispute Review Board" in the special provisions.

E. DRB MEMBER REPLACEMENT

Should the need arise to appoint a replacement DRB member, the replacement DRB member shall be appointed in the same manner as the original DRB members were appointed. The selection of a replacement DRB member shall begin promptly upon notification of the necessity for a replacement and shall be completed within 15 days. This AGREEMENT will be amended to indicate change in DRB membership.

SECTION III CONTRACTOR RESPONSIBILITIES

The CONTRACTOR shall furnish to each DRB member one copy of pertinent documents that are or may become necessary for the DRB to perform their function. Pertinent documents are written notices of potential claim, responses to those notices, drawings or sketches, calculations, procedures, schedules, estimates, or other documents which are used in the performance of the work or in justifying or substantiating the CONTRACTOR's position. The CONTRACTOR shall also furnish a copy of such pertinent documents to the STATE, in conformance with the terms outlined in the special provisions.

SECTION IV STATE RESPONSIBILITIES

The STATE will furnish the following services and items:

A. CONTRACT RELATED DOCUMENTS

The STATE will furnish to each DRB member one copy of Notice to Contractors and Special Provisions, Proposal and Contract, Plans, Standard Specifications, and Standard Plans, change orders, written instructions issued by the STATE to the CONTRACTOR, or other documents pertinent to any dispute that has been referred to the DRB and necessary for the DRB to perform its function.

B. COORDINATION AND SERVICES

The STATE, through the Engineer, will, in cooperation with the CONTRACTOR, coordinate the operations of the DRB. The Engineer will arrange or provide conference facilities at or near the project site and provide secretarial and copying services to the DRB without charge to the CONTRACTOR.

SECTION V TIME FOR BEGINNING AND COMPLETION

Once established, the DRB shall be in operation until the day of acceptance of the contract. The DRB members shall not begin work under the terms of this AGREEMENT until authorized in writing by the STATE.

SECTION VI PAYMENT

A. ALL INCLUSIVE RATE PAYMENT

The STATE and the CONTRACTOR shall bear the costs and expenses of the DRB equally. Each DRB member shall be compensated at an agreed rate of \$1,200 per day if time spent per meeting, including on-site time plus one hour of travel time, is greater than 4 hours. Each DRB member shall be compensated at an agreed rate of \$700 per day if time spent per meeting, including on-site time plus one hour of travel time, is less than or equal to 4 hours. The agreed rates shall be considered full compensation for on-site time, travel expenses, transportation, lodging, time for travel and incidentals for each day, or portion thereof, that the DRB member is at an authorized DRB meeting. No additional compensation will be made for time spent by DRB members in review and research activities outside the official DRB meetings unless that time has been specifically agreed to in advance by the STATE and CONTRACTOR. Time away from the project that has been specifically agreed to in advance by the parties will be compensated at an agreed rate of \$125 per hour. The agreed amount of \$125 per hour shall include all incidentals including expenses for telephone, fax, and computer services. Members serving on more than one DRB involving the State, regardless of the number of meetings per day, shall not be paid more than the all inclusive rate per day or rate per hour for an individual project. The STATE will provide, at no cost to the CONTRACTOR, administrative services such as conference facilities and secretarial services to the DRB.

B. PAYMENTS

DRB members shall be compensated at the same rate. The CONTRACTOR shall make direct payments to each DRB member for their participation in authorized meetings and approved hourly rate charges from invoices submitted by each DRB member. The STATE will reimburse the CONTRACTOR for its share of the costs of the DRB.

The DRB members may submit invoices to the CONTRACTOR for partial payment for work performed and services rendered for their participation in authorized meetings not more often than once per month during the progress of the work. The invoices shall be in a format approved by the parties and accompanied by a general description of activities performed during that billing period. Payment for hourly fees, at the agreed rate, shall not be paid to a DRB member until the amount and extent of those fees are approved by the STATE and CONTRACTOR.

Invoices shall be accompanied by original supporting documents, which the CONTRACTOR shall include with the extra work billing when submitting for reimbursement of the STATE's share of cost from the STATE. The CONTRACTOR will be reimbursed for one-half of approved costs of the DRB. No markups will be added to the CONTRACTOR's payment.

C. INSPECTION OF COSTS RECORDS

The DRB members and the CONTRACTOR shall keep available for inspection by representatives of the STATE and the United States, for a period of 3 years after final payment, the cost records and accounts pertaining to this AGREEMENT. If any litigation, claim, or audit arising out of, in connection with, or related to this contract is initiated before the expiration of the 3-year period, the cost records and accounts shall be retained until such litigation, claim, or audit involving the records is completed.

SECTION VII ASSIGNMENT OF TASKS OF WORK

The DRB members shall not assign the work of this AGREEMENT.

SECTION VIII TERMINATION OF AGREEMENT, THE DRB, AND DRB MEMBERS

DRB members may resign from the DRB by providing not less than 15 days written notice of the resignation to the STATE and CONTRACTOR. DRB members may be terminated by their original appointing power or by either party, for failing to fully comply at all times with all required employment and financial disclosure conditions of DRB membership in conformance with the terms of the contract.

SECTION IX LEGAL RELATIONS

The parties hereto mutually understand and agree that the DRB member in the performance of duties on the DRB, is acting in the capacity of an independent agent and not as an employee of either party.

No party to this AGREEMENT shall bear a greater responsibility for damages or personal injury than is normally provided by Federal or State of California Law.

Notwithstanding the provisions of this contract that require the CONTRACTOR to indemnify and hold harmless the STATE, the parties shall jointly indemnify and hold harmless the DRB members from and against all claims, damages, losses, and expenses, including but not limited to attorney's fees, arising out of and resulting from the findings and recommendations of the DRB.

SECTION X CONFIDENTIALITY

The parties hereto mutually understand and agree that all documents and records provided by the parties in reference to issues brought before the DRB, which documents and records are marked "Confidential - for use by the DRB only," shall be kept in confidence and used only for the purpose of resolution of subject disputes, and for assisting in development of DRB findings and recommendations; that such documents and records will not be utilized or revealed to others, except to officials of the parties who are authorized to act on the subject disputes, for any purposes, during the life of the DRB. Upon termination of this AGREEMENT, said confidential documents and records, and all copies thereof, shall be returned to the parties who furnished them to the DRB. However, the parties understand that such documents shall be subsequently discoverable and admissible in court or arbitration proceedings unless a protective order has been obtained by the party seeking further confidentiality.

SECTION XI DISPUTES

Disputes between the parties hereto, including disputes between the DRB members and either party or both parties, arising out of the work or other terms of this AGREEMENT, which cannot be resolved by negotiation and mutual concurrence between the parties, or through the administrative process provided in the contract, shall be resolved by arbitration as provided in Section 9-1.10, "Arbitration," of the Standard Specifications.

SECTION XII VENUE, APPLICABLE LAW, AND PERSONAL JURISDICTION

In the event that any party, including an individual member of the DRB, deems it necessary to institute arbitration proceedings to enforce any right or obligation under this AGREEMENT, the parties hereto agree that such action shall be initiated in the Office of Administrative Hearings of the State of California. The parties hereto agree that all questions shall be resolved by arbitration by application of California law and that the parties to such arbitration shall have the right of appeal from such decisions to the Superior Court in conformance with the laws of the State of California. Venue for the arbitration shall be Sacramento or any other location as agreed to by the parties.

SECTION XIII FEDERAL REVIEW AND REQUIREMENTS

On Federal-Aid contracts, the Federal Highway Administration shall have the right to review the work of the DRB in progress, except for private meetings or deliberations of the DRB.

Other Federal requirements in this agreement shall only apply to Federal-Aid contracts.

SECTION XIV CERTIFICATION OF THE CONTRACTOR, THE DRB MEMBERS, AND THE STATE

IN WITNESS WHEREOF, the parties hereto have executed this AGREEMENT as of the day and year first above written.

DRB MEMBER

By: _____

Title: _____

DRB MEMBER

By : _____

Title : _____

DRB MEMBER

By: _____

Title : _____

CONTRACTOR

By: _____

Title: _____

CALIFORNIA STATE DEPARTMENT
OF TRANSPORTATION

By: _____

Title: _____

The time limit specified for the completion of the work contemplated herein is considered insufficient to permit completion of the work by the Contractor working a normal number of hours per day or week on a single shift basis. Should the Contractor fail to maintain the progress of the work in conformance with "Progress Schedule (Critical Path Method)" of these special provisions, additional shifts will be required to the extent necessary to ensure that the progress conforms to the above mentioned schedule and that the work will be completed within the time limit specified.

Full compensation for any additional costs occasioned by compliance with the provisions in this section shall be considered as included in the prices paid for the various contract items of work and no additional compensation will be allowed therefor.

5-1.13 FORCE ACCOUNT PAYMENT

The second, third and fourth paragraphs of Section 9-1.03A, "Work Performed by Contractor," in the Standard Specifications, shall not apply.

Attention is directed to "Overhead" of these special provisions.

To the total of the direct costs for work performed on a force account basis, computed as provided in Sections 9-1.03A(1), "Labor," 9-1.03A(2), "Materials," and 9-1.03A(3), "Equipment Rental," of the Standard Specifications, there will be added the following markups:

Cost	Percent Markup
Labor	28
Materials	10
Equipment Rental	10

The above markups shall be applied to all work performed on a force account basis, regardless of whether the work revises the current contract completion date.

The above markups, together with payments made for time-related overhead pursuant to "Overhead" of these special provisions, shall constitute full compensation for all overhead costs for work performed on a force account basis. These overhead costs shall be deemed to include all items of expense not specifically designated as cost or equipment rental in conformance with the provisions in Sections 9-1.03A(1), "Labor," 9-1.03A(2), "Materials," and 9-1.03A(3), "Equipment Rental," of the Standard Specifications. The total payment made as provided above and in the first paragraph of Section 9-1.03A, "Work Performed by Contractor," of the Standard Specifications shall be deemed to be the actual cost of the work performed on a force account basis, and shall constitute full compensation therefor. Full compensation for all overhead costs for work performed on a force account basis, and for which no adjustment is made to the quantity of time-related overhead pursuant to "Overhead" of these special provisions, shall be considered as included in the markups specified above, and no additional compensation will be allowed therefor.

When extra work to be paid for on a force account basis is performed by a subcontractor, approved in conformance with the provisions in Section 8-1.01, "Subcontracting," of the Standard Specifications, an additional markup of 7 percent will be added to the total cost of that extra work including all markups specified in this section "Force Account Payment". The additional 7 percent markup shall reimburse the Contractor for additional administrative costs, and no other additional payment will be made by reason of performance of the extra work by a subcontractor.

5-1.14 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS

The provisions of this section shall apply only to the following contract item:

ITEM CODE	ITEM
390155	ASPHALT CONCRETE (TYPE A)

The compensation payable for asphalt concrete will be increased or decreased in conformance with the provisions of this section for paving asphalt price fluctuations exceeding 10 percent (I_u/I_b is greater than 1.10 or less than 0.90) which occur during performance of the work.

The adjustment in compensation will be determined in conformance with the following formulae when the item of asphalt concrete is included in a monthly estimate:

- A. Total monthly adjustment = AQ
- B. For an increase in paving asphalt price index exceeding 10 percent:

$$A = 0.90 (1.1023) (I_u/I_b - 1.10) I_b$$

- C. For a decrease in paving asphalt price index exceeding 10 percent:

$$A = 0.90 (1.1023) (I_u/I_b - 0.90) I_b$$

D. Where:

A = Adjustment in dollars per tonne of paving asphalt used to produce asphalt concrete rounded to the nearest \$0.01.
Iu = The California Statewide Paving Asphalt Price Index which is in effect on the first business day of the month within the pay period in which the quantity subject to adjustment was included in the estimate.

Ib = The California Statewide Paving Asphalt Price Index for the month in which the bid opening for the project occurred.

Q = Quantity in tonnes of paving asphalt that was used in producing the quantity of asphalt concrete shown under "This Estimate" on the monthly estimate using the amount of asphalt determined by the Engineer.

The adjustment in compensation will also be subject to the following:

- A. The compensation adjustments provided herein will be shown separately on payment estimates. The Contractor shall be liable to the State for decreased compensation adjustments and the Department may deduct the amount thereof from moneys due or that may become due the Contractor.
- B. Compensation adjustments made under this section will be taken into account in making adjustments in conformance with the provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.
- C. In the event of an overrun of contract time, adjustment in compensation for paving asphalt included in estimates during the overrun period will be determined using the California Statewide Paving Asphalt Price Index in effect on the first business day of the month within the pay period in which the overrun began.

The California Statewide Paving Asphalt Price Index is determined each month on the first business day of the month by the Department using the median of posted prices in effect as posted by Chevron, Mobil, and Unocal for the Buena Vista, Huntington Beach, Kern River, Long Beach, Midway Sunset, and Wilmington fields.

In the event that the companies discontinue posting their prices for a field, the Department will determine an index from the remaining posted prices. The Department reserves the right to include in the index determination the posted prices of additional fields.

5-1.15 AREAS FOR CONTRACTOR'S USE

Attention is directed to the provisions in Section 7-1.19, "Rights in Land and Improvements," of the Standard Specifications and these special provisions.

The highway right of way shall be used only for purposes that are necessary to perform the required work. The Contractor shall not occupy the right of way, or allow others to occupy the right of way, for purposes which are not necessary to perform the required work.

No State-owned parcels adjacent to the right of way are available for the exclusive use of the Contractor within the contract limits. The Contractor shall secure, at the Contractor's own expense, areas required for plant sites, storage of equipment or materials, or for other purposes.

No area is available within the contract limits for the exclusive use of the Contractor. However, temporary storage of equipment and materials on State property may be arranged with the Engineer, subject to the prior demands of State maintenance forces and to other contract requirements. Use of the Contractor's work areas and other State-owned property shall be at the Contractor's own risk, and the State shall not be held liable for damage to or loss of materials or equipment located within such areas.

The Contractor shall remove equipment, materials, and rubbish from the work areas and other State-owned property which the Contractor occupies. The Contractor shall leave the areas in a presentable condition in conformance with the provisions in Section 4-1.02, "Final Cleaning Up," of the Standard Specifications.

The Contractor shall secure, at the Contractor's own expense, areas required for plant sites, storage of equipment or materials or for other purposes, if sufficient area is not available to the Contractor within the contract limits, or at the sites designated on the plans outside the contract limits.

5-1.16 PAYMENTS

Attention is directed to Sections 9-1.06, "Partial Payments," and 9-1.07, "Payment After Acceptance," of the Standard Specifications and these special provisions.

For the purpose of making partial payments pursuant to Section 9-1.06, "Partial Payments," of the Standard Specifications, the amount set forth for the contract items of work hereinafter listed shall be deemed to be the maximum value of the contract item of work which will be recognized for progress payment purposes:

A. Bridge removal	\$119,200
B. Bridge removal (portion), Mission Ave. UC	\$35,000
C. Bridge removal (portion), location B	\$25,500
D. Bridge removal (portion), location C	\$4,500
E. Progress Schedule (Critical Path Method)	\$10,000

After acceptance of the contract pursuant to the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, the amount, if any, payable for a contract item of work in excess of the maximum value for progress payment purposes hereinabove listed for the item, will be included for payment in the first estimate made after acceptance of the contract.

In determining the partial payments to be made to the Contractor, only the following listed materials will be considered for inclusion in the payment as materials furnished but not incorporated in the work:

- ◆ Earth retaining structures
- ◆ Soil nail assembly
- ◆ Steel piling
- ◆ Prestressing cast-in-place concrete
- ◆ Tieback anchors
- ◆ Precast prestressed concrete I-girders
- ◆ Joint Seal (MR 50 mm)
- ◆ Bar reinforcing steel
- ◆ Sign structure
- ◆ Chain link railing
- ◆ Irrigation controllers
- ◆ Irrigation controller enclosure cabinets
- ◆ Plastic pipe (Supply Lines)
- ◆ Sprinklers
- ◆ Valves and Valve Boxes
- ◆ Backflow Preventer assemblies
- ◆ Back flow Preventer assembly Enclosures
- ◆ Fiber Optic Cables
- ◆ Innerducts
- ◆ Luminaries
- ◆ Lighting Fixtures
- ◆ Signal and Lighting Standards
- ◆ Signal Heads and Mounting Brackets
- ◆ Splice Vault
- ◆ Fiber Optic Conduit

5-1.17 SOUND CONTROL REQUIREMENTS

Sound control shall conform to the provisions in Section 7-1.01I, "Sound Control Requirements," of the Standard Specifications and these special provisions.

The noise level from the Contractor's operations, between the hours of 9:00 p.m. and 6:00 a.m., shall not exceed 86 dBa at a distance of 15 m. This requirement shall not relieve the Contractor from responsibility for complying with local ordinances regulating noise level.

The noise level requirement shall apply to the equipment on the job or related to the job, including but not limited to trucks, transit mixers or transient equipment that may or may not be owned by the Contractor. The use of loud sound signals shall be avoided in favor of light warnings except those required by safety laws for the protection of personnel.

Full compensation for conforming to the requirements of this section shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

5-1.18 AERIALY DEPOSITED LEAD

Aerially deposited lead is present within the project limits. Aerially deposited lead is lead deposited within unpaved areas or formerly unpaved areas, primarily due to vehicle emissions.

Attention is directed to "Material Containing Aerially Deposited Lead" of these special provisions.

Portions of the Site Investigation Report are included in the "Material Information" handout. The complete report, entitled "Lead Investigation Route 91 (Mary Street) to the Rte. 60/215 Interchange," is available for inspection at the Department of Transportation, Environmental Engineering, phone (909) 383-5917.

Aerially deposited lead is typically found within the top 0.6-m of material in unpaved areas within the highway right of way. Levels of lead found near the project limits range from less than 1.2 to 3,430 mg/kg total lead with an average concentration of 47.4 mg/kg total lead, as analyzed by EPA Test Method 6010 or EPA Test Method 7000 series.

Once the Contractor has completed the placement of material containing aerially deposited lead in conformance with these special provisions and as directed by the Engineer, the Contractor shall have no responsibility for such materials in place. The Department will not consider the Contractor a generator of such contaminated materials. Further cleanup, removal or remedial actions for such materials will not be required if handled or disposed of as specified herein.

Excavation, reuse, and disposal of material with aerially deposited lead shall be in conformance with all rules and regulations including, but not limited to, those of the following agencies:

United States Department of Transportation (USDOT)
United States Environmental Protection Agency (USEPA)
California Environmental Protection Agency (Cal-EPA)
California Department of Health Services
Department of Toxic Substances Control (DTSC), Region 3
California Division of Occupational Safety and Health Administration (Cal-OSHA)
Integrated Waste Management Board
Regional Water Quality Control Board (RWQCB), Region 8
State Air Resources Control Board
South Coast Air Quality Management District (AQMD)

Materials containing hazardous levels of lead shall be transported and disposed of in conformance with Federal and State laws and regulations, as amended, and county and municipal ordinances and regulations, as amended. Laws and regulations that govern this work include, but are not limited to:

Health and Safety Code, Division 20, Chapter 6.5 (California Hazardous Waste Control Act)
Title 22, California Code of Regulations, Division 4.5 (Environmental Health Standards for the Management of Hazardous Waste)
Title 8, California Code of Regulations

SECTION 6. (BLANK)

SECTION 7. (BLANK)

SECTION 8. MATERIALS

SECTION 8-1. MISCELLANEOUS

8-1.01 SUBSTITUTION OF NON-METRIC MATERIALS AND PRODUCTS

Only materials and products conforming to the requirements of the specifications shall be incorporated in the work. When metric materials and products are not available, and when approved by the Engineer, and at no cost to the State, materials and products in the United States Standard Measures which are of equal quality and of the required properties and characteristics for the purpose intended, may be substituted for the equivalent metric materials and products, subject to the following provisions:

- A. Materials and products shown on the plans or in the special provisions as being equivalent may be substituted for the metric materials and products specified or detailed on the plans.
- B. Before other non-metric materials and products will be considered for use, the Contractor shall furnish, at the Contractor's expense, evidence satisfactory to the Engineer that the materials and products proposed for use are equal to or better than the materials and products specified or detailed on the plans. The burden of proof as to the quality and suitability of substitutions shall be upon the Contractor and the Contractor shall furnish necessary

information as required by the Engineer. The Engineer will be the sole judge as to the quality and suitability of the substituted materials and products and the Engineer's decision will be final.

- C. When the Contractor elects to substitute non-metric materials and products, including materials and products shown on the plans or in the special provisions as being equivalent, the list of sources of material specified in Section 6-1.01, "Source of Supply and Quality of Materials," of the Standard Specification shall include a list of substitutions to be made and contract items involved. In addition, for a change in design or details, the Contractor shall submit plans and working drawings in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The plans and working drawings shall be submitted at least 7 days before the Contractor intends to begin the work involved.

Unless otherwise specified, the following substitutions of materials and products will be allowed:

SUBSTITUTION TABLE FOR SIZES OF HIGH STRENGTH STEEL FASTENERS

ASTM Designation: A 325M

METRIC SIZE SHOWN ON THE PLANS mm x thread pitch	SIZE TO BE SUBSTITUTED inch
M16 x 2	5/8
M20 x 2.5	3/4
M22 x 2.5	7/8
M24 x 3	1
M27 x 3	1-1/8
M30 x 3.5	1-1/4
M36 x 4	1-1/2

SUBSTITUTION TABLE FOR PLAIN WIRE REINFORCEMENT

ASTM Designation: A 82

METRIC SIZE SHOWN ON THE PLANS mm ²	SIZE TO BE SUBSTITUTED inch ² x 100
MW9	W1.4
MW10	W1.6
MW13	W2.0
MW15	W2.3
MW19	W2.9
MW20	W3.1
MW22	W3.5
MW25	W3.9, except W3.5 in piles only
MW26	W4.0
MW30	W4.7
MW32	W5.0
MW35	W5.4
MW40	W6.2
MW45	W6.5
MW50	W7.8
MW55	W8.5, except W8.0 in piles only
MW60	W9.3
MW70	W10.9, except W11.0 in piles only
MW80	W12.4
MW90	W14.0
MW100	W15.5

SUBSTITUTION TABLE FOR BAR REINFORCEMENT

METRIC BAR DESIGNATION NUMBER¹ SHOWN ON THE PLANS	BAR DESIGNATION NUMBER² TO BE SUBSTITUTED
10	3
13	4
16	5
19	6
22	7
25	8
29	9
32	10
36	11
43	14
57	18

¹Bar designation numbers approximate the number of millimeters of the nominal diameter of the bars.

²Bar numbers are based on the number of eighths of an inch included in the nominal diameter of the bars.

No adjustment will be required in spacing or total number of reinforcing bars due to a difference in minimum yield strength between metric and non-metric bars.

SUBSTITUTION TABLE FOR SIZES OF:

(1) STEEL FASTENERS FOR GENERAL APPLICATIONS (ASTM Designation: A 307 or AASHTO Designation: M 314, Grade 36 or 55), and

(2) HIGH STRENGTH STEEL FASTENERS (ASTM Designation: A 325 or A 449)

METRIC SIZE SHOWN ON THE PLANS mm	SIZE TO BE SUBSTITUTED inch
6 or 6.35	1/4
8 or 7.94	5/16
10 or 9.52	3/8
11 or 11.11	7/16
13 or 12.70	1/2
14 or 14.29	9/16
16 or 15.88	5/8
19 or 19.05	3/4
22 or 22.22	7/8
24, 25, or 25.40	1
29 or 28.58	1-1/8
32 or 31.75	1-1/4
35 or 34.93	1-3/8
38 or 38.10	1-1/2
44 or 44.45	1-3/4
51 or 50.80	2
57 or 57.15	2-1/4
64 or 63.50	2-1/2
70 or 69.85	2-3/4
76 or 76.20	3
83 or 82.55	3-1/4
89 or 88.90	3-1/2
95 or 95.25	3-3/4
102 or 101.60	4

SUBSTITUTION TABLE FOR NOMINAL THICKNESS OF SHEET METAL

UNCOATED HOT AND COLD ROLLED SHEETS		HOT-DIPPED ZINC COATED SHEETS (GALVANIZED)	
METRIC THICKNESS SHOWN ON THE PLANS mm	GAGE TO BE SUBSTITUTED inch	METRIC THICKNESS SHOWN ON THE PLANS mm	GAGE TO BE SUBSTITUTED inch
7.94	0.3125	4.270	0.1681
6.07	0.2391	3.891	0.1532
5.69	0.2242	3.510	0.1382
5.31	0.2092	3.132	0.1233
4.94	0.1943	2.753	0.1084
4.55	0.1793	2.372	0.0934
4.18	0.1644	1.994	0.0785
3.80	0.1495	1.803	0.0710
3.42	0.1345	1.613	0.0635
3.04	0.1196	1.461	0.0575
2.66	0.1046	1.311	0.0516
2.28	0.0897	1.158	0.0456
1.90	0.0747	1.006 or 1.016	0.0396
1.71	0.0673	0.930	0.0366
1.52	0.0598	0.853	0.0336
1.37	0.0538	0.777	0.0306
1.21	0.0478	0.701	0.0276
1.06	0.0418	0.627	0.0247
0.91	0.0359	0.551	0.0217
0.84	0.0329	0.513	0.0202
0.76	0.0299	0.475	0.0187
0.68	0.0269	-----	-----
0.61	0.0239	-----	-----
0.53	0.0209	-----	-----
0.45	0.0179	-----	-----
0.42	0.0164	-----	-----
0.38	0.0149	-----	-----

SUBSTITUTION TABLE FOR WIRE

METRIC THICKNESS SHOWN ON THE PLANS mm	WIRE THICKNESS TO BE SUBSTITUTED inch	GAGE NO.
6.20	0.244	3
5.72	0.225	4
5.26	0.207	5
4.88	0.192	6
4.50	0.177	7
4.11	0.162	8
3.76	0.148	9
3.43	0.135	10
3.05	0.120	11
2.69	0.106	12
2.34	0.092	13
2.03	0.080	14
1.83	0.072	15
1.57	0.062	16
1.37	0.054	17
1.22	0.048	18
1.04	0.041	19
0.89	0.035	20

SUBSTITUTION TABLE FOR PIPE PILES

METRIC SIZE SHOWN ON THE PLANS mm x mm	SIZE TO BE SUBSTITUTED inch x inch
PP 360 x 4.55	NPS 14 x 0.179
PP 360 x 6.35	NPS 14 x 0.250
PP 360 x 9.53	NPS 14 x 0.375
PP 360 x 11.12	NPS 14 x 0.438
PP 406 x 12.70	NPS 16 x 0.500
PP 460 x T	NPS 18 x T"
PP 508 x T	NPS 20 x T"
PP 559 x T	NPS 22 x T"
PP 610 x T	NPS 24 x T"
PP 660 x T	NPS 26 x T"
PP 711 x T	NPS 28 x T"
PP 762 x T	NPS 30 x T"
PP 813 x T	NPS 32 x T"
PP 864 x T	NPS 34 x T"
PP 914 x T	NPS 36 x T"
PP 965 x T	NPS 38 x T"
PP 1016 x T	NPS 40 x T"
PP 1067 x T	NPS 42 x T"
PP 1118 x T	NPS 44 x T"
PP 1219 x T	NPS 48 x T"
PP 1524 x T	NPS 60 x T"

The thickness in millimeters (T) represents an exact conversion of the thickness in inches (T").

SUBSTITUTION TABLE FOR STRUCTURAL TIMBER AND LUMBER

METRIC MINIMUM DRESSED DRY, SHOWN ON THE PLANS mm x mm	METRIC MINIMUM DRESSED GREEN, SHOWN ON THE PLANS mm x mm	NOMINAL SIZE TO BE SUBSTITUTED inch x inch
19x89	20x90	1x4
38x89	40x90	2x4
64x89	65x90	3x4
89x89	90x90	4x4
140x140	143x143	6x6
140x184	143x190	6x8
184x184	190x190	8x8
235x235	241x241	10x10
286x286	292x292	12x12

SUBSTITUTION TABLE FOR NAILS AND SPIKES

METRIC COMMON NAIL, SHOWN ON THE PLANS Length, mm Diameter, mm	METRIC BOX NAIL, SHOWN ON THE PLANS Length, mm Diameter, mm	METRIC SPIKE, SHOWN ON THE PLANS Length, mm Diameter, mm	SIZE TO BE SUBSTITUTED Penny-weight
50.80 2.87	50.80 2.51	————	6d
63.50 3.33	63.50 2.87	————	8d
76.20 3.76	76.20 3.25	76.20 4.88	10d
82.55 3.76	82.55 3.25	82.55 4.88	12d
88.90 4.11	88.90 3.43	88.90 5.26	16d
101.60 4.88	101.60 3.76	101.60 5.72	20d
114.30 5.26	114.30 3.76	114.30 6.20	30d
127.00 5.72	127.00 4.11	127.00 6.68	40d
————	————	139.70 7.19	50d
————	————	152.40 7.19	60d

**SUBSTITUTION TABLE FOR IRRIGATION
COMPONENTS**

METRIC WATER METERS, TRUCK LOADING STANDPIPES, VALVES, BACKFLOW PREVENTERS, FLOW SENSORS, WYE STRAINERS, FILTER ASSEMBLY UNITS, PIPE SUPPLY LINES, AND PIPE IRRIGATION SUPPLY LINES SHOWN ON THE PLANS DIAMETER NOMINAL (DN) mm	NOMINAL SIZE TO BE SUBSTITUTED inch
15	1/2
20	3/4
25	1
32	1-1/4
40	1-1/2
50	2
65	2-1/2
75	3
100	4
150	6
200	8
250	10
300	12
350	14
400	16

Unless otherwise specified, substitutions of United States Standard Measures standard structural shapes corresponding to the metric designations shown on the plans and in conformance with the requirements in ASTM Designation: A 6/A 6M, Annex 2, will be allowed.

8-1.02 PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS

The Department maintains the following list of Prequalified and Tested Signing and Delineation Materials. The Engineer shall not be precluded from sampling and testing products on the list of Prequalified and Tested Signing and Delineation Materials.

The manufacturer of products on the list of Prequalified and Tested Signing and Delineation Materials shall furnish the Engineer a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each type of traffic product supplied.

For those categories of materials included in the list of Prequalified and Tested Signing and Delineation Materials, only those products shown within the listing may be used in the work. Other categories of products, not included in the list of Prequalified and Tested Signing and Delineation Materials, may be used in the work provided they conform to the requirements of the Standard Specifications.

Materials and products may be added to the list of Prequalified and Tested Signing and Delineation Materials if the manufacturer submits a New Product Information Form to the New Product Coordinator at the Transportation Laboratory. Upon a Departmental request for samples, sufficient samples shall be submitted to permit performance of required tests. Approval of materials or products will depend upon compliance with the specifications and tests the Department may elect to perform.

PAVEMENT MARKERS, PERMANENT TYPE

Retroreflective With Abrasion Resistant Surface (ARS)

- A. Apex, Model 921AR (100 mm x 100 mm)
- B. Ray-O-Lite, Model "AA" ARS (100 mm x 100 mm)
- C. Stimsonite, Models 911 (100 mm x 100 mm) and 953 (70 mm x 114 mm)
- D. 3M Series 290 (89 mm x 100 mm)

Retroreflective With Abrasion Resistant Surface (ARS)

(Used for recessed applications)

- A. Stimsonite, Model 948 (58 mm x 119 mm)
- B. Ray-O-Lite, Model 2002 (58 mm x 117 mm)
- C. Stimsonite, Model 944SB (51 mm x 100 mm)
- D. Ray-O-Lite, Model 2004 ARS (51 mm x 100 mm)*

*For use only in 114 mm wide (older) recessed slots

Non-Reflective For Use With Epoxy Adhesive, 100 mm Round

- A. Apex Universal (Ceramic)
- B. Highway Ceramics, Inc. (Ceramic)

Non-Reflective For Use With Bitumen Adhesive, 100 mm Round

- A. Alpine Products, "D-Dot" and "ANR" (ABS)
- B. Apex Universal (Ceramic)
- C. Apex Universal, Models 929 (ABS) and 929PP (Polypropylene)
- D. Elgin Molded Plastics, "Empco-Lite" Model 900 (ABS)
- E. Highway Ceramics, Inc. (Ceramic)
- F. Hi-Way Safety, Inc., Models P20-2000W and 2001Y (ABS)
- G. Interstate Sales, "Diamond Back" (ABS) and (Polypropylene)
- H. Novabrite Models Adot-w (White) Adot-y (Yellow), (ABS)
- I. Road Creations, Model RCB4NR (Acrylic)
- J. Zumar Industries, "Titan TM40A" (ABS)

PAVEMENT MARKERS, TEMPORARY TYPE

Temporary Markers For Long Term Day/Night Use (6 months or less)

- A. Apex Universal, Model 924 (100 mm x 100 mm)
- B. Elgin Molded Plastics, "Empco-Lite" Model 901 (100 mm x 100 mm)
- C. Road Creations, Model R41C (100 mm x 100 mm)
- D. Vega Molded Products "Temporary Road Marker" (75 mm x 100 mm)

Temporary Markers For Short Term Day/Night Use (14 days or less)

(For seal coat or chip seal applications, clear protective covers are required)

- A. Apex Universal, Model 932
- B. Bunzl (formerly Davidson Plastics, Models) T.O.M., T.R.P.M., and "HH" (High Heat)
- C. Hi-Way Safety, Inc., Model 1280/1281

STRIPING AND PAVEMENT MARKING MATERIAL

Permanent Traffic Striping and Pavement Marking Tape

- A. Advanced Traffic Marking, Series 300 and 400
- B. Brite-Line, Series 1000
- C. Brite-Line, "DeltaLine XRP"
- D. Swarco Industries, "Director 35" (For transverse application only)
- E. Swarco Industries, "Director 60"
- F. 3M, "Stamark" Series 380 and 5730
- G. 3M, "Stamark" Series 420 (For transverse application only)

Temporary (Removable) Striping and Pavement Marking Tape (6 months or less)

- A. Advanced Traffic Marking, Series 200
- B. Brite-Line, Series 100
- C. P.B. Laminations, Aztec, Grade 102
- D. Swarco Industries, "Director-2"
- E. Trelleborg Industri, R140 Series
- F. 3M, Series 620 and Series 7750
- G. 3M, Series A145, Removable Black Line Mask
(Black Tape: for use only on Asphalt Concrete Surfaces)
- H. Advanced Traffic Marking Black "Hide-A-Line"
(Black Tape: for use only on Asphalt Concrete Surfaces)
- I. Brite-Line "BTR" Black Removable Tape
(Black Tape: for use only on Asphalt Concrete Surfaces)
- J. Trelleborg Industri, RB-140
(Black Tape: for use only on Asphalt Concrete Surfaces)

Preformed Thermoplastic (Heated in place)

- A. Flint Trading, "Premark" and "Premark 20/20 Flex"
- B. Avery Dennison, "Hotape"

Removable Traffic Paint

- A. Belpro, Series 250/252 and No. 93 Remover

Ceramic Surfacing Laminate, 150 mm x 150 mm

- A. Safeline Industries/Highway Ceramics, Inc.

CLASS 1 DELINEATORS

One Piece Driveable Flexible Type, 1700 mm

- A. Carsonite, Curve-Flex CFRM-400
- B. Carsonite, Roadmarker CRM-375
- C. Bunzl (Formerly Davidson Plastics), "Flexi-Guide Models 400 and 566"
- D. FlexStake, Model 654 TM
- E. GreenLine Models HWD1-66 and CGD1-66
- F. J. Miller Industries, Model JMI-375 (with soil anchor)

Special Use Flexible Type, 1700 mm

- A. Carsonite, "Survivor" (with 450 mm U-Channel base)
- B. FlexStake, Model 604
- C. GreenLine Models HWD and CGD (with 450 mm U-Channel base)
- D. Safe-Hit with 200 mm pavement anchor (SH248-GP1)
- E. Safe-Hit with 380 mm soil anchor (SH248-GP2) and with 450 mm soil anchor (SH248-GP3)

Surface Mount Flexible Type, 1200 mm

- A. Bent Manufacturing Company, Masterflex Model MF-180EX-48
- B. Carsonite, "Super Duck II"
- C. FlexStake, Surface Mount, Models 704 and 754 TM

CHANNELIZERS

Surface Mount Type, 900 mm

- A. Bent Manufacturing Company, Masterflex Models MF-360-36 (Round) and MF-180-36 (Flat)
- B. Carsonite, "Super Duck" (Flat SDF-436, Round SDR-336)
- C. Carsonite, "Super Duck II" Model SDCF203601MB "The Channelizer"
- D. Bunzl (Formerly Davidson Plastics), Flex-Guide Models FG300LD and FG300UR
- E. FlexStake, Surface Mount, Models 703 and 753 TM
- F. GreenLine, Model SMD-36
- G. Hi-Way Safety, Inc. "Channel Guide Channelizer" Model CGC36
- H. The Line Connection, "Dura-Post" Model DP36-3 (Permanent)
- I. The Line Connection, "Dura-Post" Model DP36-3C (Temporary)
- J. Repo, Models 300 and 400
- K. Safe-Hit, Guide Post, Model SH236SMA

CONICAL DELINEATORS, 1070 mm

(For 700 mm Traffic Cones, see Standard Specifications)

- A. Bent Manufacturing Company "T-Top"
- B. Plastic Safety Systems "Navigator-42"
- C. Radiator Specialty Company "Enforcer"
- D. Roadmaker Company "Stacker"
- E. Traffix Devices "Grabber"

OBJECT MARKERS

Type "K", 450 mm

- A. Carsonite, Model SMD 615
- B. FlexStake, Model 701 KM
- C. Repo, Models 300 and 400
- D. Safe-Hit, Model SH718SMA
- E. The Line Connection, Model DP21-4K

Type "K-4" / "Q" Object Markers, 600 mm

- A. Bent Manufacturing "Masterflex" Model MF-360-24
- B. Carsonite, Super Duck II
- C. FlexStake, Model 701KM
- D. Repo, Models 300 and 400
- E. Safe-Hit, Models SH8 24SMA_WA and SH8 24GP3_WA
- F. The Line Connection, Model DP21-4Q

TEMPORARY RAILING (TYPE K) REFLECTORS AND CONCRETE BARRIER MARKERS

Impactable Type

- A. ARTUK, "FB"
- B. Bunzl (Formerly Davidson Plastics), Model PCBM-12
- C. Duraflex Corp., "Flexx 2020" and "Electriflexx"
- D. Hi-Way Safety, Inc., Model GMKRM100

Non-Impactable Type

- A. ARTUK, JD Series
- B. Stimsonite, Model 967 (with 83 mm Acrylic cube corner reflector)
- C. Stimsonite, Model 967LS
- D. Vega Molded Products, Models GBM and JD

THREE BEAM BARRIER MARKERS

(For use to the left of traffic)

- A. Duraflex Corp., "Railrider"
- B. Bunzl (Formerly Davidson Plastics), "Mini" (75 mm x 254 mm)

CONCRETE BARRIER DELINEATORS, 400 mm

(For use to the right of traffic. When mounted on top of barrier, place top of reflective element at 1200 mm)

- A. Bunzl (Formerly Davidson Plastics), Model PCBM T-16
- B. Safe-Hit, Model SH216RBM
- C. Sun-Lab Technology, "Safety Guide Light, Model TM," 130 mm x 130 mm x 80 mm

CONCRETE BARRIER-MOUNTED MINI-DRUM (260 mm x 360 mm x 570 mm)

- A. Stinson Equipment Company "SaddleMarker"

SOUND WALL DELINEATOR

(Applied vertically. Place top of 75 mm x 300 mm reflective element at 1200 mm above roadway)

- A. Bunzl (Formerly Davidson Plastics), PCBM S-36
- B. Sun-Lab Technology, "Safety Guide Light, Model SM12," 130 mm x 130 mm x 80 mm

GUARD RAILING DELINEATOR

(Place top of reflective element at 1200 mm above plane of roadway)

Wood Post Type, 686 mm

- A. Carsonite, Model 427
- B. Bunzl (Formerly Davidson Plastics), FG 427 and FG 527
- C. FlexStake, Model 102 GR
- D. GreenLine GRD 27
- E. J.Miller Model JMI-375G
- F. Safe-Hit, Model SH227GRD

Steel Post Type

- A. Carsonite, Model CFGR-327 with CFGRBK300 Mounting Bracket

RETROREFLECTIVE SHEETING**Channelizers, Barrier Markers, and Delineators**

- A. 3M, High Intensity
- B. Reflexite, PC-1000 Metalized Polycarbonate
- C. Reflexite, AC-1000 Acrylic
- D. Reflexite, AP-1000 Metalized Polyester
- E. Reflexite, Conformalight, AR-1000 Abrasion Resistant Coating
- F. Avery Dennison T-6500 Series (Formerly Stimsonite, Series 6200) (For rigid substrate devices only)
- G. Nippon Carbide, Flexible Ultralite Grade (ULG) II

Traffic Cones, 330 mm Sleeves

- A. Reflexite SB (Polyester), Vinyl or "TR" (Semi-transparent)

Traffic Cones, 100 mm and 150 mm Sleeves

- A. 3M Series 3840
- B. Reflexite Vinyl, "TR" (Semi-transparent) or "Conformalight"
- C. Nippon Carbide, Flexible Ultralite Grade (ULG) II

Barrels and Drums

- A. Reflexite, "Conformalight", "Super High Intensity" or "High Impact Drum Sheeting"
- B. 3M Series 3810
- C. Nippon Carbide, Flexible Ultralite Grade (ULG) II
- D. Avery Dennison W-6100

Barricades: Type I, Engineer Grade

- A. American Decal, Adcolite
- B. Avery Dennison, T-1500 and T-1600 series
- C. 3M, Engineer Grade, Series 3170

Barricades: Type II, Super Engineer Grade

- A. Avery Dennison, T-2500 Series
- B. Kiwalite Type II
- C. Nikkalite 1800 Series

Signs: Type II, Super Engineer Grade

- A. Avery Dennison, T-2500 Series
- B. Kiwalite, Type II
- C. Nikkalite 1800 Series

Signs: Type III, High-Intensity Grade

- A. 3M Series 3800
- B. Nippon Carbide, Nikkalite Brand Ultralite Grade II

Signs: Type IV, High-Intensity Prismatic Grade

- A. Avery Dennison T-6500 (Formerly Stimsonite Series 6200)

Signs: Type VII, High-Intensity Prismatic Grade

- A. 3M Series 3900

Signs: Type VI, Roll-Up Signs

- A. Reflexite, Vinyl (Orange)
- B. Reflexite "SuperBright" (Fluorescent orange)
- C. Reflexite "Marathon" (Fluorescent orange)
- D. 3M Series RS34 (Orange) and RS20 (Fluorescent orange)

SPECIALTY SIGN (All Plastic)

- A. All Sign Products, STOP Sign, 750 mm

SIGN SUBSTRATE FOR CONSTRUCTION AREA SIGNS

Aluminum

Fiberglass Reinforced Plastic (FRP)

- A. Sequentia, "Polyplate"
- B. Fiber-Brite

8-1.03 STATE-FURNISHED MATERIALS

Attention is directed to Section 6-1.02, "State-Furnished Materials," of the Standard Specifications and these special provisions.

The following materials will be furnished to the Contractor:

- A. Sign panels for roadside signs and overhead sign structures.
- B. Laminated wood box posts with metal caps for roadside signs.
- C. Hardware for mounting sign panels as follows:
 - 1. Blind rivets for mounting overlapping legend at sign panel joints.
 - 2. Closure inserts.
 - 3. Aluminum bolts and nuts and steel beveled washers for mounting laminated sign panels on overhead sign structures.
 - 4. Aluminum bolts, nuts, and washers for mounting overhead formed panels.
- D. Model 170 controller assembly assemblies, including controller unit, completely wired controller cabinet, and inductive loop detector sensor units.

Padlocks for the backflow preventer assembly enclosures and irrigation controller enclosure cabinets will be furnished to the Contractor.

The Contractor shall notify the Engineer not less than 48 hours before State-furnished material is to be picked up by the Contractor. A full description of the material and the time the material will be picked up shall be provided. State-furnished controller assembly will be furnished to the Contractor at the Department of Transportation Redistribution Warehouse located at 175 Cluster Street, San Bernardino, California.

8-1.04 SLAG AGGREGATE

Aggregate produced from slag resulting from any steel-making process or from air-cooled iron blast furnace slag shall not be used on this project.

8-1.05 ENGINEERING FABRICS

Engineering fabrics shall conform to the provisions in Section 88, "Engineering Fabrics," of the Standard Specifications and these special provisions.

Filter fabric for this project shall be ultraviolet (UV) ray protected.

SECTION 8-2. CONCRETE

8-2.01 PORTLAND CEMENT CONCRETE

Portland cement concrete shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions.

References to Section 90-2.01, "Portland Cement," of the Standard Specifications shall mean Section 90-2.01, "Cement," of the Standard Specifications.

Mineral admixture shall be combined with cement in conformance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures," of the Standard Specifications for the concrete materials specified in Section 56-2, "Roadside Signs," of the Standard Specifications.

The requirements of Section 90-4.08, "Required Use of Mineral Admixture," of the Standard Specifications shall not apply to Section 19-3.025C, "Soil Cement Bedding," of the Standard Specifications.

The Department maintains a list of sources of fine and coarse aggregate that have been approved for use with a reduced amount of mineral admixture in the total amount of cementitious material to be used. A source of aggregate will be considered for addition to the approved list if the producer of the aggregate submits to the Transportation Laboratory certified test results from a qualified testing laboratory that verify the aggregate complies with the requirements. Prior to starting the testing, the aggregate test shall be registered with the Department. A registration number can be obtained by calling (916) 227-7228. The registration number shall be used as the identification for the aggregate sample in correspondence with the Department. Upon request, a split of the tested sample shall be provided to the Department. Approval of aggregate will depend upon compliance with the specifications, based on the certified test results submitted, together with any replicate testing the Department may elect to perform. Approval will expire 3 years from the date the most recent registered and evaluated sample was collected from the aggregate source.

Qualified testing laboratories shall conform to the following requirements:

- A. Laboratories performing ASTM Designation: C 1293 shall participate in the Cement and Concrete Reference Laboratory (CCRL) Concrete Proficiency Sample Program and shall have received a score of 3 or better on all tests of the previous 2 sets of concrete samples.
- B. Laboratories performing ASTM Designation: C 1260 shall participate in the Cement and Concrete Reference Laboratory (CCRL) Pozzolan Proficiency Sample Program and shall have received a score of 3 or better on the shrinkage and soundness tests of the previous 2 sets of pozzolan samples.

Aggregates on the list shall conform to one of the following requirements:

- A. When the aggregate is tested in conformance with the requirements in California Test 554 and ASTM Designation: C 1293, the average expansion at one year shall be less than or equal to 0.040 percent; or
- B. When the aggregate is tested in conformance with the requirements in California Test 554 and ASTM Designation: C 1260, the average of the expansion at 16 days shall be less than or equal to 0.15 percent.

The amounts of cement and mineral admixture used in cementitious material shall be sufficient to satisfy the minimum cementitious material content requirements specified in Section 90-1.01, "Description," or Section 90-4.05, "Optional Use of Chemical Admixtures," of the Standard Specifications and shall conform to the following:

- A. The minimum amount of cement shall not be less than 75 percent by mass of the specified minimum cementitious material content.

- B. The minimum amount of mineral admixture to be combined with cement shall be determined using one of the following criteria:
1. When the calcium oxide content of a mineral admixture is equal to or less than 2 percent by mass, the amount of mineral admixture shall not be less than 15 percent by mass of the total amount of cementitious material to be used in the mix.
 2. When the calcium oxide content of a mineral admixture is greater than 2 percent by mass, and any of the aggregates used are not listed on the approved list as specified in these special provisions, then the amount of mineral admixture shall not be less than 25 percent by mass of the total amount of cementitious material to be used in the mix.
 3. When the calcium oxide content of a mineral admixture is greater than 2 percent by mass and the fine and coarse aggregates are listed on the approved list as specified in these special provisions, then the amount of mineral admixture shall not be less than 15 percent by mass of the total amount of cementitious material to be used in the mix.
 4. When a mineral admixture that conforms to the provisions for silica fume in Section 90-2.04, "Admixture Materials," of the Standard Specifications is used, the amount of mineral admixture shall not be less than 10 percent by mass of the total amount of cementitious material to be used in the mix.
 5. When a mineral admixture that conforms to the provisions for silica fume in Section 90-2.04, "Admixture Materials," of the Standard Specifications is used and the fine and coarse aggregates are listed on the approved list as specified in these special provisions, then the amount of mineral admixture shall not be less than 7 percent by mass of the total amount of cementitious material to be used in the mix.
- C. The total amount of mineral admixture shall not exceed 35 percent by mass of the total amount of cementitious material to be used in the mix. Where Section 90-1.01, "Description," of the Standard Specifications specifies a maximum cementitious content in kilograms per cubic meter, the total mass of cement and mineral admixture per cubic meter shall not exceed the specified maximum cementitious material content.

Unless otherwise specified, mineral admixture will not be required in portland cement concrete used for precast concrete girders.

The Contractor will be permitted to use Type III portland cement for concrete used in the manufacture of precast concrete members.

SECTION 8-3. WELDING

8-3.01 WELDING

GENERAL

Flux core welding electrodes conforming to the requirements of AWS A5.20 E6XT-4 or E7XT-4 shall not be used to perform any type of welding for this project.

Wherever reference is made to the following AWS welding codes in the Standard Specifications, on the plans, or in these special provisions, the year of adoption for these codes shall be as listed:

AWS Code	Year of Adoption
D1.1	2000
D1.4	1992
D1.5	1995
D1.5 (metric only)	1996

Requirements of the AWS welding codes shall apply unless specified otherwise in the Standard Specifications, on the plans, or in these special provisions. Wherever the abbreviation AWS is used, it shall be equivalent to the abbreviations ANSI/AWS or ANSI/AASHTO/AWS.

Sections 6.1.2 through 6.1.4.3 of AWS D 1.1, Sections 7.1.1 and 7.1.2 of AWS D 1.4, and Sections 6.1.1.1 through 6.1.3.3 of AWS D 1.5 are replaced with the following:

Quality Control (QC) shall be the responsibility of the Contractor. As a minimum, the Contractor shall perform inspection and testing prior to welding, during welding, and after welding as specified in this section and additionally as necessary to ensure that materials and workmanship conform to the requirements of the contract documents.

The QC Inspector shall be the duly designated person who acts for and on behalf of the Contractor for inspection, testing, and quality related matters for all welding.

Quality Assurance (QA) is the prerogative of the Engineer. The QA Inspector is the duly designated person who acts for and on behalf of the Engineer.

Each QC Inspector shall be responsible for quality control acceptance or rejection of materials and workmanship, and shall be currently certified as an AWS Certified Welding Inspector (CWI) in conformance with the requirements in AWS QC1, "Standard and Guide for Qualification of Welding Inspectors."

The QC Inspector may be assisted by an Assistant QC Inspector provided that this individual is currently certified as an AWS Certified Associate Welding Inspector (CAWI) in conformance with the requirements in AWS QC1, "Standard and Guide for Qualification of Welding Inspectors," or has equivalent qualifications. The QC Inspector shall monitor the Assistant QC Inspector's work, and shall be responsible for signing all reports.

When the term "Inspector" is used without further qualification, it shall refer to the QC Inspector.

Section 6.14.6, "Personnel Qualification," of AWS D 1.1, Section 7.7.6, "Personnel Qualification," of AWS D 1.4, and Section 6.1.3.4, "Personnel Qualification," of AWS D 1.5 are replaced with the following:

Personnel performing nondestructive testing (NDT) shall be qualified in conformance with the requirements of the American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A and the Written Practice of the NDT firm. The Written Practice of the NDT firm shall meet or exceed the requirements of the ASNT Recommended Practice No. SNT-TC-1A. Only individuals who are 1) qualified for NDT Level II, or 2) Level III technicians who have been directly certified by the ASNT and are authorized to perform the work of Level II technicians, shall perform NDT, review the results, and prepare the written reports.

Section 6.5.4, "Scope of Examination," of AWS D 1.1 and Section 7.5.4 of AWS D 1.4 are replaced with the following:

The QC Inspector shall inspect and approve the joint preparation, assembly practice, welding techniques, and performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of this code and the approved welding procedure specification (WPS) are met.

Section 6.5.4 of AWS D 1.5 is replaced with the following:

The QC Inspector shall inspect and approve the joint preparation, assembly practice, welding techniques, and performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of this code and the approved WPS are met. The QC Inspector shall examine the work to make certain that it meets the requirements of Sections 3 and 9.21. The size and contour of welds shall be measured using suitable gages. Visual inspection for cracks in welds and base metal, and for other discontinuities should be aided by strong light magnifiers, or such other devices as may be helpful. Acceptance criteria different from those specified in this code may be used when approved by the Engineer.

Section 6.6.5, "Nonspecified Nondestructive Testing Other Than Visual," of AWS D 1.1, Section 6.6.5 of AWS D 1.4 and Section 6.6.5 of AWS D 1.5 shall not apply.

For any welding, the Engineer may direct the Contractor to perform NDT that is in addition to the visual inspection or NDT specified in the AWS welding codes, in the Standard Specifications, or in these special provisions. Additional NDT required by the Engineer, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. Should any welding deficiencies be discovered by this additional NDT, the cost of the testing will not be paid for as extra work but shall be at the Contractor's expense.

Required repair work to correct welding deficiencies, whether discovered by the required visual inspection or NDT, or by additional NDT directed by the Engineer, and any associated delays or expenses caused to the Contractor by performing these repairs, shall be at the Contractor's expense.

The Engineer shall have the authority to verify the qualifications or certifications of any welder, QC Inspector, or NDT personnel to specified levels by retests or other means.

A sufficient number of QC Inspectors shall be provided to ensure continuous inspection when any welding is being performed. Continuous inspection, as a minimum, shall include (1) having QC Inspectors continually present when any welding operation is being performed, or (2) having a QC Inspector within such close proximity of all welding operations that inspections by the QC Inspector of each operation, at each welding location, shall not lapse for a period exceeding 30 minutes.

Inspection and approval of the joint preparation, assembly practice, welding techniques, and performance of each welder, welding operator, and tack welder shall be documented by the QC Inspector on a daily basis for each day that welding is performed.

When joint details that are not prequalified by the applicable AWS codes are proposed for use in the work, welders using these details shall perform a qualification test plate using the approved WPS variables and the joint detail to be used in production. The test plate shall be the maximum thickness to be used in production. The test plate shall be mechanically or radiographically tested as directed by the Engineer. Mechanical and radiographic testing and acceptance criteria shall be as specified in the applicable AWS codes.

The period of effectiveness for a welder's or welding operator's qualification shall be a maximum of 3 years for the same weld process, welding position, and weld type. A valid qualification at the beginning of work on a contract will be acceptable for the entire period of the contract, as long as the welder's work remains satisfactory.

WELDING QUALITY CONTROL

Welding quality control shall conform to the requirements in the AWS welding codes, the Standard Specifications, and these special provisions.

Unless otherwise specified, welding quality control shall apply when any work is welded in conformance with the provisions in Section 49, "Piling," Section 52, "Reinforcement," Section 55, "Steel Structures," Section 56-1, "Overhead Sign Structures," Section 75-1.035, "Bridge Joint Restrainer Units," or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

The welding of fracture critical members (FCMs) shall conform to the provisions specified in the Fracture Control Plan (FCP) and herein.

The Contractor shall designate in writing a welding Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for the quality of welding, including materials and workmanship, performed by the Contractor and subcontractors.

The QCM shall be the sole individual responsible to the Contractor for submitting, receiving, and approving all correspondence, required submittals, and reports to and from the Engineer.

The QCM shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project. The QCM may be an employee of the Contractor.

Welding inspection personnel or NDT firms to be used in the work shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project, except for the following conditions:

- A. The welding is performed at a permanent fabrication facility which is certified under the AISC Quality Certification Program, Category Cbr, Major Steel Bridges.
- B. The welding is performed at a permanent fabrication facility which is certified under the AISC Quality Certification Program, Category Sbd, Conventional Steel Building Structures. This condition shall apply only for work welded in conformance with the provisions in Section 56-1, "Overhead Sign Structures" or Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

For welding performed at such certified facilities, the inspection personnel or NDT firms may be employed or compensated by the fabrication facility performing the welding.

Prior to submitting the Welding Quality Control Plan (WQCP) required herein, a pre-welding meeting between the Engineer, Contractor, and any entity performing welding for this project, shall be held to discuss the requirements for the WQCP.

Except for work that is welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, prior to performing any welding, the Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 3 copies of a separate WQCP for each item of work for which welding is to be performed.

Prior to furnishing materials welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, the Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 3 copies of a separate WQCP for each fabrication facility supplying these materials or proof of previous Engineer approval of a WQCP for such a facility no more than one year prior to the delivery of materials for inspection.

As a minimum, each WQCP shall include the following:

- A. The name of the welding firm and any required NDT firms;
- B. A manual prepared by the NDT firm that shall include equipment, testing procedures, code of safe practices, the Written Practice of the NDT firm, and the names, qualifications, and documentation of certifications for all personnel to be used;

- C. The name of the QCM and the names, qualifications, and documentation of certifications for all QC Inspectors and Assistant QC Inspectors to be used;
- D. An organizational chart showing all QC personnel and their assigned QC responsibilities;
- E. The methods and frequencies for performing all required quality control procedures, including QC inspection forms to be used, as required by the specifications including:
 - 1. all visual inspections;
 - 2. all NDT including radiographic geometry, penetrometer and shim selection, film quality, film processing, radiograph identification and marking system, and film interpretation and reports; and
 - 3. calibration procedures and calibration frequency for all NDT equipment;
- F. A system for the identification and tracking of all welds, NDT, and any required repairs, and a procedure for the reinspection of repaired welds. The system shall have provisions for 1) permanently identifying each weld and the person who performed the weld, 2) placing all identification and tracking information on each radiograph, 3) a method of reporting nonconforming welds to the Engineer, and 4) a method of documentation of repairs and reinspection of nonconforming welds;
- G. Standard procedures for performing noncritical repair welds. Noncritical repair welds are defined as welds to deposit additional weld beads or layers to compensate for insufficient weld size and to fill limited excavations that were performed to remove unacceptable edge or surface discontinuities, rollover or undercut. The depth of these excavations shall not exceed 65 percent of the specified weld size;
- H. The WPS, including documentation of all supporting Procedure Qualification Record (PQR) tests performed, and the name of the testing laboratory who performed the tests, to verify the acceptability of the WPS. The submitted WPS shall be within the allowable period of effectiveness;
- I. Documentation of all certifications for welders for each weld process and position that will be used. Certifications shall list the electrodes used, test position, base metal and thickness, tests performed, and the witnessing authority. All certifications shall be within the allowable period of effectiveness;
- J. One copy each of all AWS welding codes and the FCP which are applicable to the welding to be performed. These codes and the FCP shall become the permanent property of the Department; and
- K. Forms to be used for Certificates of Compliance, daily production logs, and daily reports.

The Engineer shall have 10 working days to review the WQCP submittal after a complete plan has been received. Except for work that is welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, no welding shall be performed until the WQCP is approved in writing by the Engineer. No materials welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, shall be incorporated into the work until the WQCP is approved in writing by the Engineer. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the WQCP, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

An amended WQCP or addendum shall be submitted to, and approved in writing by the Engineer, for proposed revisions to the approved WQCP. An amended WQCP or addendum will be required for revisions to the WQCP, including but not limited to a revised WPS, additional welders, changes in NDT firms or procedures, QC, or NDT personnel, or updated systems for tracking and identifying welds. The Engineer shall have 3 working days to complete the review of the amended WQCP or addendum. Work that is affected by any of the proposed revisions shall not be performed until the amended WQCP or addendum has been approved. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the amended WQCP or addendum, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

After final approval of the WQCP, amended WQCP, or addendum, the Contractor shall submit 7 copies to the Engineer of each of these approved documents.

It is expressly understood that the Engineer's approval of the Contractor's WQCP shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work in conformity with the requirements of the plans and specifications. The Engineer's approval shall not constitute a waiver of any requirement of the plans and specifications nor relieve the Contractor of any obligation thereunder, and defective work, materials, and equipment may be rejected notwithstanding approval of the WQCP.

A daily production log for welding shall be kept by the QCM for each day that welding is performed. The log shall clearly indicate the locations of all welding, except partial penetration longitudinal seam welds performed in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications. The log shall include the welders' names, amount of welding performed, any problems or deficiencies discovered, and any testing or repair work performed, at each location. The daily report from each QC Inspector shall also be included in the log.

The following items shall be included in a Welding Report that is to be submitted to the Engineer within 7 days following the performance of any welding. For work welded in conformance with Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, the following items shall be included in a Welding Report that is to be submitted to the Engineer 48 hours prior to the Contractor furnishing a Certificate of Compliance for the material:

- A. Reports of all visual weld inspections and NDT;
- B. Radiographs and radiographic reports, and other required NDT reports;
- C. Documentation that the Contractor has evaluated all radiographs and other nondestructive tests and corrected all rejectable deficiencies, and all repaired welds have been reexamined by the required NDT and found acceptable; and
- D. Daily production log.

Radiographic envelopes shall have clearly written on the outside of the envelope the following information: name of the QCM, name of the nondestructive testing firm, name of the radiographer, date, contract number, complete part description, and all included weld numbers or a report number, as detailed in the WQCP. In addition, all innerleaves shall have clearly written on them the part description and all included weld numbers, as detailed in the WQCP.

Reports regarding NDT, including radiographs, shall be signed by both the NDT technician and the person that performed the review, and then submitted directly to the QCM for review and signature prior to submittal to the Engineer. Corresponding names shall be clearly printed or typewritten next to all signatures.

The Engineer will review the Welding Report to determine if the Contractor is in conformance with the WQCP. Unless otherwise specified, the Engineer shall be allowed 7 working days to review the report and respond in writing after a complete Welding Report has been received. Prior to receiving notification from the Engineer of the Contractor's conformance with the WQCP, the Contractor may encase in concrete or cover welds for which a Welding Report has been submitted. However, should the Contractor elect to encase or cover those welds prior to receiving notification from the Engineer, it is expressly understood that the Contractor shall not be relieved of the responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase or cover welds pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The QC Inspector shall provide reports to the QCM on a daily basis for each day that welding is performed.

Except for noncritical weld repairs, the Engineer shall be notified immediately in writing when welding problems, deficiencies, base metal repairs, or any other type of repairs not submitted in the WQCP are discovered and also of the proposed repair procedures to correct them. The Engineer shall have 5 working days to review these procedures. No remedial work shall begin until the repair procedures are approved in writing by the Engineer. Should the Engineer fail to complete the review within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the proposed repair procedures, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The QCM shall sign and furnish to the Engineer, a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each item of work for which welding was performed. The certificate shall state that all of the materials and workmanship incorporated in the work, and all required tests and inspections of this work, have been performed in conformance with the details shown on the plans and the provisions of the Standard Specifications and these special provisions.

PAYMENT

Full compensation for conforming to the requirements of this section shall be considered as included in the contract prices paid for the various items of work involved and no additional compensation will be allowed therefor.

SECTION 9. DESCRIPTION OF BRIDGE WORK

This work shall consist, in general, of constructing precast prestressed concrete I-girder widenings with approach slabs, Type N, as shown on the plans for:

UNIVERSITY AVENUE UNDERCROSSING
(Bridge Number 56-0314)

MISSION INN AVENUE UNDERCROSSING
(Bridge Number 56-0315)

THIRD STREET UNDERCROSSING
(Bridge Number 56-0316);

Removing the existing concrete box girder overcrossing and constructing a reinforced concrete cast in place prestressed box girder overcrossing, as shown on the plans for:

SPRUCE STREET OVERCROSSING
(Bridge Number 56-0800)

Constructing concrete retaining walls, as shown on the plans for:

RETAINING WALL NUMBER 91-119

RETAINING WALL NUMBER 91-120

RETAINING WALL NUMBER 91-121

RETAINING WALL NUMBER 91-122

RETAINING WALL NUMBER 91-123

RETAINING WALL NUMBER 91-124A

RETAINING WALL NUMBER 91-129A

RETAINING WALL NUMBER 91-136A

RETAINING WALL NUMBER 91-136B

RETAINING WALL NUMBER 91-137B;

RETAINING WALL NUMBER 91-137C

RETAINING WALL NUMBER 91-138

constructing mechanically stabilized embankment retaining walls, as shown on the plans for:

MSE RETAINING WALL NUMBER 91-124B

MSE RETAINING WALL NUMBER 128;

and constructing a soil nail wall, including a tieback wall portion, as shown on the plans for:

RETAINING WALL NUMBER 189.

SECTION 10. CONSTRUCTION DETAILS

SECTION 10-1. GENERAL

10-1.00 CONSTRUCTION PROJECT INFORMATION SIGNS

Before any major physical construction work readily visible to highway users is started on this contract, the Contractor shall furnish and erect 4 Type 2 Construction Project Information signs at the locations designated by the Engineer.

The signs and overlays shall be of a type and material consistent with the estimated time of completion of the project and shall conform to the details shown on the plans.

The sign letters, border and the Department's construction logos shall conform to the colors (non-reflective) and details shown on the plans, and shall be on a white background (non-reflective). The colors blue and orange shall conform to PR Color Number 3 and Number 6, respectively, as specified in the Federal Highway Administration's Color Tolerance Chart.

The sign message to be used for fund types shall consist of the following, in the order shown:

FEDERAL HIGHWAY TRUST FUNDS

The sign message to be used for type of work shall consist of the following:

HIGHWAY CONSTRUCTION HIGHWAY IMPROVEMENT BRIDGE CONSTRUCTION
--

The sign message to be used for the Year of Completion of Project Construction will be furnished by the Engineer. The Contractor shall furnish and install the "Year" sign overlay within 10 working days of notification of the year date to be used.

The letter sizes to be used shall be as shown on the plans. The information shown on the signs shall be limited to that shown on the plans.

The signs shall be kept clean and in good repair by the Contractor.

Upon completion of the work, the signs shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

Full compensation for furnishing, erecting, maintaining, and removing and disposing of the construction project information signs shall be considered as included in the contract lump sum price paid for construction area signs and no additional compensation will be allowed therefor.

10-1.01 ORDER OF WORK

Order of work shall conform to the provisions in Section 5-1.05, "Order of Work," of the Standard Specifications and these special provisions.

A first order of work shall be to construct shotcrete test panels.

Work on the University Avenue Undercrossing shall not be allowed from October 1 to December 31.

The first order of work shall be to place the order for the traffic signal equipment. The Engineer shall be furnished a statement from the vendor that the order for the traffic signal equipment has been received and accepted by the vendor.

The uppermost layer of new pavement shall not be placed until all underlying conduits and loop detectors have been installed.

Prior to commencement of the traffic signal functional test at any location, all items of work related to signal control shall be completed and all roadside signs, pavement delineation, and pavement markings shall be in place at that location.

Attention is directed to "Maintaining Traffic" and "Temporary Pavement Delineation" of these special provisions and to the stage construction sheets of the plans.

Attention is directed to "Progress Schedule (Critical Path Method)" of these special provisions regarding the submittal of a general time-scaled logic diagram within 10 days after approval of the contract. The diagram shall be submitted prior to performing any work that may be affected by any proposed deviations to the construction staging of the project.

The work shall be performed in conformance with the stages of construction shown on the plans. Nonconflicting work in subsequent stages may proceed concurrently with work in preceding stages, provided satisfactory progress is maintained in the preceding stages of construction.

In each stage, after completion of the preceding stage, the first order of work shall be the removal of existing pavement delineation as directed by the Engineer. Pavement delineation removal shall be coordinated with new delineation so that lane lines are provided at all times on traveled ways open to public traffic.

Before obliterating any pavement delineation (traffic stripes, pavement markings, and pavement markers) that is to be replaced on the same alignment and location, as determined by the Engineer, the pavement delineation shall be referenced by the Contractor, with a sufficient number of control points to reestablish the alignment and location of the new pavement delineation. The references shall include the limits or changes in striping pattern, including one- and 2-way barrier lines, limit lines, crosswalks and other pavement markings. Full compensation for referencing existing pavement delineation shall be considered as included in the contract prices paid for new pavement delineation and no additional compensation will be allowed therefor.

Prior to applying Asphalt Concrete (Type A), the Contractor shall cover all manholes, valve and monument covers, grates, or other exposed facilities located within the area of application, using a plastic or oil resistant construction paper secured to the facility being covered by tape or adhesive. The covered facilities shall be referenced by the Contractor, with a sufficient number of control points to relocate the facilities after the paving has been placed. After completion of the paving operation, all covers shall be removed and disposed of in a manner satisfactory to the Engineer. Full compensation for covering manholes, valve and monument covers, grates, or other exposed facilities, referencing, and removing temporary cover shall be considered as included in the contract price paid per tonne for Asphalt Concrete (Type A), and no additional compensation will be allowed therefor.

At the end of each working day if a difference in excess of 0.045-meter exists between the elevation of the existing pavement and the elevation of excavations within 3.6 m of the traveled way, material shall be placed and compacted against the vertical cuts adjacent to the traveled way. During excavation operations, native material may be used for this purpose; however, once placing of the structural section commences, structural material shall be used. The material shall be placed to the level of the elevation of the top of existing pavement and tapered at a slope of 1:4 (vertical:horizontal) or flatter to the bottom of the excavation. Treated base shall not be used for the taper. Full compensation for placing the material on a 1:4 slope, regardless of the number of times the material is required, and subsequent removing or reshaping of the material to the lines and grades shown on the plans shall be considered as included in the contract price paid for the materials involved and no additional compensation will be allowed therefor. No payment will be made for material placed in excess of that required for the structural section.

Not less than 60 days prior to planting the plants, the Contractor shall furnish the Engineer a statement from the vendor that the order for the plants required for this contract, including inspection plants, has been received and accepted by the vendor. The statement from the vendor shall include the names, sizes, and quantities of plants ordered and the anticipated date of delivery.

The Contractor shall place orders for replacement plants with the vendor at the appropriate time so that the roots of the replacement plants are not in a root-bound condition.

Attention is directed to "Maintain Existing Planted Areas" of these special provisions regarding checking for deficiencies of existing plants that are to remain in place, prior to the start of irrigation work.

Attention is directed to "Irrigation Systems Functional Test" of these special provisions, regarding restrictions for planting operations.

Unless otherwise shown on the plans or specified in these special provisions, conduits to be jacked or drilled or installed by the open trench method for water line crossovers and sprinkler control crossovers shall be installed prior to the installation of other pipe supply lines.

Attention is directed to "Existing Highway Irrigation Facilities" of these special provisions regarding the checking of existing irrigation facilities that are to remain in place, prior to the start of any irrigation work.

Clearing, grubbing, and earthwork operations shall not be performed in areas where existing irrigation facilities are to remain in place until existing irrigation facilities have been checked for proper operation in conformance with the provisions in "Existing Highway Irrigation Facilities" of these special provisions.

Attention is directed to Section 20-5.027B, "Wiring Plans and Diagrams," of the Standard Specifications regarding submittal of working drawings.

Attention is directed to "Transplant Existing Palm Tree" of these special provisions regarding the time restraints specified for transplanting palm trees.

10-1.02 WATER POLLUTION CONTROL (STORM WATER POLLUTION PREVENTION PLAN)

Water pollution control work shall conform to the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications and these special provisions.

This project lies within the boundaries of the Santa Ana Regional Water Quality Control Board and shall conform to the requirements of the National Pollutant Discharge Elimination System (NPDES) Permit for General Construction Activities No. CAS000002, Order No. 99-08-DWQ, including State Water Resources Control Board (SWRCB) Resolution No. 2001-046, and the NPDES Permit for the State of California Department of Transportation Properties, Facilities, and Activities, No. CAS000003, Order No. 99-06-DWQ issued by the SWRCB. These permits, hereafter referred to as the "Permits," regulate storm water discharges associated with construction activities.

Water pollution control work shall conform to the requirements in the "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual" and the "Construction Site Best Management Practices (BMPs) Manual," and addenda thereto issued up to, and including, the date of advertisement of the project, hereafter referred to respectively as the "Preparation Manual" and the "Construction Site BMP Manual" and collectively as the "Manuals." In addition, water pollution control work shall conform to the requirements in the Sampling and Analysis Bulletin. Copies of the Manuals and the Permits may be obtained from the Department of Transportation, Material Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520. Copies of the Manuals and the Sampling and Analysis Bulletin may also be obtained from the Department's Internet Web Site at: <http://www.dot.ca.gov/hq/construc/stormwater.html>.

The Contractor shall know and fully comply with the applicable provisions of the Manuals, Permits, and Federal, State, and local regulations that govern the Contractor's operations and storm water discharges from both the project site and areas of disturbance outside the project limits during construction. The Contractor shall maintain copies of the Permits at the project site and shall make the Permits available during construction.

Unless arrangements for disturbance or use of areas outside the project limits are made by the Department and made part of the contract, it is expressly agreed that the Department assumes no responsibility for the Contractor or property owner with respect to any arrangements made between the Contractor and property owner. The Contractor shall implement, inspect and maintain all necessary water pollution control practices to satisfy all applicable Federal, State, and Local laws and regulations that govern water quality for areas used outside of the highway right-of-way or areas arranged for the specific use of the Contractor for this project. Installing, inspecting, and maintaining water pollution control practices on areas outside the highway right-of-way not specifically arranged for and provided for by the Department for the execution of this contract will not be paid for.

The Contractor shall be responsible for the costs and for liabilities imposed by law as a result of the Contractor's failure to comply with the provisions set forth in this section "Water Pollution Control (Storm Water Pollution Prevention Plan)", including but not limited to, compliance with the applicable provisions of the Manuals, Permits and Federal, State and local regulations. Costs and liabilities include, but are not limited to, fines, penalties, and damages whether assessed against the State or the Contractor, including those levied under the Federal Clean Water Act and the State Porter Cologne Water Quality Act.

In addition to the remedies authorized by law, money due the Contractor under the contract, in an amount determined by the Department, may be retained by the State of California until disposition has been made of the costs and liabilities.

When a regulatory agency or other third party identifies a failure to comply with the permit or any other local, State, or federal requirement, the Engineer may retain money due the Contractor, subject to the following:

- A. The Department will give the Contractor 30 days notice of the Department's intention to retain funds from partial payments which may become due to the Contractor prior to acceptance of the contract. Retention of funds from payments made after acceptance of the contract may be made without prior notice to the Contractor.
- B. No retention of additional amounts out of partial payments will be made if the amount to be retained does not exceed the amount being withheld from partial payments pursuant to Section 9-1.06, "Partial Payments," of the Standard Specifications.
- C. If the Department has retained funds and it is subsequently determined that the State is not subject to the costs and liabilities in connection with the matter for which the retention was made, the Department shall be liable for interest on the amount retained for the period of the retention, and the rate of interest payable shall be 6 percent per annum.

Conformance with the provisions of this section "Water Pollution Control (Storm Water Pollution Prevention Plan)" shall not relieve the Contractor from the Contractor's responsibilities, as provided in Section 7, "Legal Relations and Responsibility," of the Standard Specifications.

The Contractor shall notify the Engineer immediately upon request from the regulatory agencies to enter, inspect, sample, monitor or otherwise access the project site or the Contractor's records pertaining to water pollution control work.

STORM WATER POLLUTION PREVENTION PLAN PREPARATION, APPROVAL AND AMENDMENTS

As part of the water pollution control work, a Storm Water Pollution Prevention Plan, hereafter referred to as the "SWPPP," is required for this contract. The SWPPP shall conform to the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications, the requirements in the Manuals, the requirements of the Permits, and these special provisions. Upon the Engineer's approval of the SWPPP, the SWPPP shall be considered to fulfill the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications for development and submittal of a Water Pollution Control Program.

No work having potential to cause water pollution, as determined by the Engineer, shall be performed until the SWPPP has been approved by the Engineer.

The Contractor shall designate a Water Pollution Control Manager. The Water Pollution Control Manager shall be responsible for the preparation of the SWPPP and any required modifications or amendments and shall be responsible for the implementation and adequate functioning of the various water pollution control practices employed. The Water Pollution Control Manager shall serve as the primary contact for all issues related to the SWPPP or its implementation. The Contractor shall submit to the Engineer a statement of qualifications, describing the training, previous work history and expertise of the individual selected by the Contractor to serve as Water Pollution Control Manager. The Engineer will reject the Contractor's submission of a Water Pollution Control Manager if the submitted qualifications are deemed to be inadequate.

Within 30 days after the approval of the contract, the Contractor shall submit 3 copies of the draft SWPPP to the Engineer. The Engineer will have 15 days to review the SWPPP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the SWPPP within 15 days of receipt of the Engineer's comments. The Engineer will have 15 days to review the revisions. Upon the Engineer's approval of the SWPPP, 4 approved copies of the SWPPP, incorporating the required changes, shall be submitted to the Engineer. In order to allow construction activities to proceed, the Engineer may conditionally approve the SWPPP while minor revisions are being completed. If the Engineer does not review or approve the SWPPP within the time specified, compensation will be made in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The SWPPP shall apply to all areas that are directly related to construction including, but not limited to, staging areas, storage yards, material borrow areas, and access roads within or outside of the highway right-of-way.

The SWPPP shall incorporate water pollution control practices in the following six categories:

- A. Soil stabilization;
- B. Sediment control;
- C. Wind erosion control;
- D. Tracking control;
- E. Non-storm water control; and
- F. Waste management and material pollution control.

The Contractor shall develop a Water Pollution Control Schedule that shall describe the timing of grading or other work activities that could affect water pollution. The Water Pollution Control Schedule shall be updated by the Contractor to reflect any changes in the Contractor's operations that would affect the necessary implementation of water pollution control practices.

The Contractor shall incorporate the "Minimum Requirements" presented in the Preparation Manual into the SWPPP. In addition to the "Minimum Requirements" presented in the Preparation Manual, the Contractor shall complete the BMP Consideration Checklist presented in the Preparation Manual. The Contractor shall identify and incorporate into the SWPPP the water pollution control practices selected by the Contractor or as directed by the Engineer.

The Contractor shall prepare an amendment to the SWPPP when there is a change in construction activities or operations which may affect the discharge of pollutants to surface waters, ground waters, municipal storm drain systems, or when the Contractor's activities or operations violate any condition of the Permits, or when directed by the Engineer. Amendments shall show additional water pollution control practices or revised operations, including those areas or operations not shown in the initially approved SWPPP. Amendments to the SWPPP shall be prepared, and submitted for review and approval in the same manner as specified for the SWPPP approval. Subsequent amendments shall be submitted within a time approved by the Engineer, but in no case longer than the time specified for the initial submittal and review of the SWPPP. At a minimum, the SWPPP shall be amended annually and submitted to the Engineer 25 days prior to the defined rainy season.

The Contractor shall keep one copy of the approved SWPPP and approved amendments at the project site. The SWPPP shall be made available upon request of a representative of the Regional Water Quality Control Board, State Water Resources Control Board, United States Environmental Protection Agency or the local storm water management agency. Requests by the public shall be directed to the Engineer.

COST BREAK-DOWN

The Contractor shall submit to the Engineer a cost break-down for the contract lump sum item of water pollution control, together with the SWPPP.

The cost break-down shall be completed and furnished in the format shown in the example of the cost break-down included in this section. Unit descriptions and quantities shall be designated by the Contractor, except for the specified special requirements shown in the example. The units and quantities given in the example, if provided, are special requirements specified for the SWPPP, and shall be included in the cost break-down furnished to the Engineer. The Contractor shall verify the estimated quantities of the special requirements and submit revised quantities in the cost break-down.

The Contractor shall determine the quantities required to complete the work of water pollution control. The quantities and their values shall be included in the cost break-down submitted to the Engineer for approval. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-down submitted for approval. The cost break-down shall not include water pollution control practices which are shown on the plans and for which there is a separate contract item.

The sum of the amounts for the units of work listed in the cost break-down shall be equal to the contract lump sum price paid for water pollution control. Profit shall be included in each individual unit listed in the cost break-down. The cost break-down shall be submitted and approved within the same times specified for the SWPPP. Partial payment for the item of water pollution control will not be made until the cost break-down is approved, in writing, by the Engineer. Attention is directed to "Overhead" of these special provisions.

Adjustments in the items of work and quantities listed in the approved cost break-down shall be made when required to address amendments to the SWPPP, except when the adjusted items are paid for as extra work.

No adjustment in compensation will be made in the contract lump sum price paid for water pollution control due to differences between the quantities shown in the approved cost break-down and the quantities required to complete the work as shown on the approved SWPPP. No adjustment in compensation will be made for ordered changes to correct SWPPP work resulting from the Contractor's own operations or from the Contractor's negligence.

The approved cost break-down will be used to determine partial payments during the progress of the work and as the basis for calculating the adjustment in compensation for the item of water pollution control due to increases or decreases of quantities ordered by the Engineer. When an ordered change increases or decreases the quantities of an approved cost break-down item, the adjustment in compensation will be determined in the same manner specified for increases and decreases in the quantity of a contract item of work in conformance with the provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications. If an ordered change requires a new item not on the approved cost break-down, the adjustment in compensation will be determined in the same manner specified for extra work in conformance with Section 4-1.03D, "Extra Work," of the Standard Specifications.

If requested by the Contractor and approved by the Engineer, changes to the water pollution control practices listed in the approved cost break-down, including the addition of new water pollution control practices, will be allowed. The changes shall be included in an approved amendment to the SWPPP. If the changes to the water pollution control practices requested by the Contractor would result in a net cost increase to the lump sum price for water pollution control, an adjustment in compensation will be made without change to the item of water pollution control. The net cost increase to the item of water pollution control resulting from changes requested by the Contractor will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

WATER POLLUTION CONTROL COST BREAK-DOWN

Contract No. 08-334834

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT

TOTAL _____

SWPPP IMPLEMENTATION

Upon approval of the SWPPP, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting, maintaining, removing, and disposing of the water pollution control practices included in the SWPPP and any amendments. Unless otherwise directed by the Engineer, the Contractor's responsibility for SWPPP implementation shall continue throughout any temporary suspension of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. Requirements for installation, construction, inspection, maintenance, removal, and disposal of water pollution control practices are specified in the Manuals and these special provisions.

If the Contractor or the Engineer identifies a deficiency in any aspect of the implementation of the approved SWPPP or amendments, the deficiency shall be corrected immediately. The deficiency may be corrected at a later date and time if requested by the Contractor and approved by the Engineer in writing, but not later than the onset of precipitation. If the Contractor fails to correct the identified deficiency by the date agreed or prior to the onset of precipitation the project shall be in noncompliance. Attention is directed to Section 5-1.01, "Authority of the Engineer," of the Standard Specifications and the payment sections of these special provisions for possible noncompliance penalties.

If the Contractor fails to conform to the provisions of "Water Pollution Control (Storm Water Pollution Prevention Plan)," the Engineer may order the suspension of construction operations which create water pollution.

Implementation of water pollution control practices may vary by season. The Construction Site BMP Manual and these special provisions shall be followed for control practice selection of year round, rainy season and non-rainy season water pollution control practices.

Year-Round Implementation Requirements

The Contractor shall have a year-round program for implementing, inspecting and maintaining water pollution control practices for wind erosion control, tracking control, non-storm water control, and waste management and materials pollution control.

The National Weather Service weather forecast shall be monitored and used by the Contractor on a daily basis. An alternative weather forecast proposed by the Contractor may be used if approved by the Engineer. If precipitation is predicted, the necessary water pollution control practices shall be deployed prior to the onset of the precipitation.

Disturbed soil areas shall be considered active whenever the soil disturbing activities have occurred, continue to occur or will occur during the ensuing 21 days. Non-active areas shall be protected as prescribed in the Construction Site BMP Manual within 14 days of cessation of soil disturbing activities or prior to the onset of precipitation, whichever occurs first.

In order to provide effective erosion control the Contractor may be directed to apply permanent erosion control in small or multiple units as disturbed soil areas are deemed substantially complete by the Engineer. The Contractor's attention is directed to "Erosion Control (Type D)" and "Move-In/Move-Out (Erosion Control)" of these special provisions.

Rainy Season Requirements

Soil stabilization and sediment control practices conforming to the requirements in the Special Requirements and applicable Preparation Manual Minimum Requirements, shall be provided throughout the rainy season, defined as between October 1st and May 1st.

Rainy Season Requirements

Throughout the defined rainy season, the active disturbed soil area of the project site shall be not more than 2 hectares. The Engineer may approve, on a case-by-case basis, expansions of the active disturbed soil area limit. Soil stabilization and sediment control materials shall be maintained on site sufficient to protect the unprotected disturbed soil area. A detailed plan for the mobilization of sufficient labor and equipment shall be maintained to deploy the water pollution control practices required to protect the project site prior to the onset of precipitation events.

Non-Rainy Season Requirements

The non-rainy season shall be defined as all days outside the defined rainy season. The Contractor's attention is directed to the Construction Site BMP Manual for soil stabilization and sediment control implementation requirements on disturbed soil areas during the non-rainy season. Disturbed soil areas within the project shall be protected in conformance with the requirements in the Construction Site BMP Manual with an effective combination of soil stabilization and sediment control.

MAINTENANCE

To ensure the proper implementation and functioning of water pollution control practices, the Contractor shall regularly inspect and maintain the construction site for the water pollution control practices identified in the SWPPP. The construction site shall be inspected by the Contractor as follows:

- A. Prior to a forecast storm;
- B. After a precipitation event which causes site runoff;
- C. At 24 hour intervals during extended precipitation events;
- D. Routinely, a minimum of once every two weeks outside of the defined rainy season;
- E. Routinely, a minimum of once every week during the defined rainy season.

The Contractor shall use the Storm Water Quality Construction Site Inspection Checklist provided in the Preparation Manual or an alternative inspection checklist provided by the Engineer. One copy of each site inspection record shall be submitted to the Engineer within 24 hours of completing the inspection.

REPORTING REQUIREMENTS

Report of Discharges, Notices or Orders

If the Contractor identifies any discharge into receiving waters in a manner causing, or potentially causing, a condition of pollution, or if the project receives a written notice or order from any regulatory agency, the Contractor shall immediately inform the Engineer. The Contractor shall submit a written report to the Engineer within 7 days of the discharge event, notice, or order. The report shall include the following information:

- A. The date, time, location, nature of the operation, and type of discharge, including the cause or nature of the notice or order.
- B. The water pollution control practices deployed before the discharge event, or prior to receiving the notice or order.
- C. The date of deployment and type of water pollution control practices deployed after the discharge event, or after receiving the notice, or order, including additional measures installed or planned to reduce or prevent reoccurrence.
- D. An implementation and maintenance schedule for any affected water pollution control practices.

Report of First-Time Non-Storm Water Discharge

The Contractor shall notify the Engineer at least 3 days in advance of each first-time non-storm water discharge event, excluding exempted discharges. The Contractor shall notify the Engineer of each different operation causing a non-storm water discharge and shall obtain field approval for each first-time non-storm water discharge. Non-storm water discharges shall be monitored at each first-time occurrence and routinely thereafter.

Annual Certifications

By June 15 of each year, the Contractor shall complete and submit an Annual Construction Activity Certification as contained in the Preparation Manual to the Engineer.

PAYMENT

The contract lump sum price paid for prepare storm water pollution prevention plan shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work involved in developing, preparing, obtaining approval of, revising, and amending the SWPPP, including the sampling and analysis plan, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Attention is directed to Section 9-1.06, "Partial Payments," and Section 9-1.07, "Payment After Acceptance," of the Standard Specifications. Payments for prepare storm water pollution prevention plan will be made as follows:

- A. After the SWPPP has been approved by the Engineer, 75 percent of the contract item price for prepare storm water pollution prevention plan will be included in the monthly partial payment estimate; and
- B. After acceptance of the contract in conformance with the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, payment for the remaining 25 percent of the contract item price for prepare storm water pollution prevention plan will be made in conformance with the provisions in Section 9-1.07.

The contract lump sum price paid for water pollution control shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing, constructing, removing, and disposing of water pollution control practices, including non-storm water and waste management and materials pollution water pollution control practices, except those shown on the plans and for which there is a contract item of work, and excluding developing, preparing, obtaining approval of, revising, and amending the SWPPP, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Storm water sampling and analysis will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

The cost of maintaining the temporary water pollution control practices shall be divided equally by the State and the Contractor as follows:

Soil Stabilization

All temporary water pollution control practices except:

SS-1 Scheduling

SS-2 Preservation of Existing Vegetation

Sediment Control

All temporary water pollution control practices.

Tracking Control

All temporary water pollution control practices except:

SC-7 Street Sweeping and Vacuuming

Wind Erosion Control

All temporary water pollution control practices.

Non-Storm Water Control

No sharing of maintenance costs will be allowed.

Waste Management & Material Control

No sharing of maintenance costs will be allowed.

The division of cost will be made by determining the cost of maintaining temporary water pollution control practices in conformance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications and paying to the Contractor one-half of that cost. Clean-up, repair, removal, disposal, improper installation, and replacement of temporary water pollution control practices damaged by the Contractor's negligence shall not be considered as included in the cost for performing maintenance and no additional compensation will be allowed therefor.

The provisions for sharing maintenance costs shall not relieve the Contractor from the responsibility for providing appropriate maintenance on those items where maintenance costs are not shared.

Full compensation for maintenance costs of water pollution control practices not shared, as specified in these special provisions, shall be considered as included in the contract lump sum price paid for water pollution control and no additional compensation will be allowed therefor.

Those water pollution control practices which are shown on the plans and for which there is a contract item of work will be measured and paid for as that contract item of work.

The Engineer will retain an amount equal to 25 percent of the estimated value of the contract work performed during estimate periods in which the Contractor fails to conform to the provisions of this section "Water Pollution Control (Storm Water Pollution Prevention Plan)," as determined by the Engineer.

Retention for failure to conform to the provisions in this section "Water Pollution Control (Storm Water Pollution Prevention Plan)" shall be in addition to the other retention provided for in the contract. The amounts retained for failure of the Contractor to conform to the provisions in this section will be released for payment on the next monthly estimate for partial payment following the date that an approved SWPPP has been implemented and maintained, and water pollution is adequately controlled, as determined by the Engineer.

10-1.03 PRESERVATION OF PROPERTY

Attention is directed to Section 7-1.11, "Preservation of Property," of the Standard Specifications and these special provisions.

Existing trees, and shrubs that are not to be removed and are injured or damaged by reason of the Contractor's operations, shall be replaced by the Contractor. The minimum size of tree replacement shall be 600 mm box and the minimum size of shrub replacement shall be No. 15 container. Replacement ground cover plants shall be from flats and shall be planted 300 mm on center. Replacement planting shall conform to the requirements in Section 20-4.07, "Replacement," of the Standard Specifications. The Contractor shall water replacement plants in conformance with the provisions in Section 20-4.06, "Watering," of the Standard Specifications.

Damaged or injured plants shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications. At the option of the Contractor, removed trees and shrubs may be reduced to chips. The chipped material shall be spread within the highway right of way at locations designated by the Engineer.

Replacement planting of injured or damaged trees, shrubs, and other plants shall be completed prior to the start of the plant establishment period. Replacement planting shall conform to the provisions in Section 20-4.05, "Planting," of the Standard Specifications.

10-1.04 DAMAGE REPAIR

Attention is directed to Section 7-1.16, "Contractor's Responsibility for the Work and Materials," and Section 7-1.165, "Damage by Storm, Flood, Tsunami or Earthquake," of the Standard Specifications and these special provisions.

When as a result of freezing conditions (as defined herein) during the plant establishment period, plants have died or, in the opinion of the Engineer, have deteriorated to a point beyond which the plants will not mature as typical examples of their species, the Engineer may direct replacement of the affected plants. The total cost of ordered plant replacement work will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. A freezing condition, for the purpose of this specification, occurs when the temperature at or near the affected area has been officially recorded below 0°C and plants have been killed or damaged to the degree described above.

When the provisions in Section 7-1.165, "Damage by Storm, Flood, Tsunami or Earthquake," of the Standard Specifications are applicable, the provisions above for payment of costs for repair of damage due to rain, freezing conditions and drought shall not apply.

10-1.05 RELIEF FROM MAINTENANCE AND RESPONSIBILITY

The Contractor may be relieved of the duty of maintenance and protection for those items not directly connected or associated with plant establishment work, except highway planting and irrigation systems in conformance with the provisions in Section 7-1.15, "Relief From Maintenance and Responsibility," of the Standard Specifications.

Attention is directed to the occupied improvement located within the right of way of Route 91, approximately 40 meters right from Station 124+46 to approximately 37 meter right from Station 125+55. It is anticipated that this improvement will be removed by January 1, 2003

Attention is directed to the occupied improvements located within the right of way of Route 60, approximately 63 meter right from Station 189+05 to approximately 58 meter right from Station 189+62. It is anticipated that these improvement will be vacated by April 1, 2003.

The Contractor shall not encroach upon these sites without prior approval of the Engineer.

The Contractor shall take no action that will result in unnecessary inconvenience, disproportionate injury or any action coercive in nature to the occupants of these improvements who have not yet moved from the improvements.

In the event that the improvements mentioned above are not removed by the date specified and, if in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of the improvements not being removed by the date specified, the State will compensate the Contractor for the delays to the extent provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

10-1.06 PROGRESS SCHEDULE (CRITICAL PATH METHOD)

The Contractor shall submit to the Engineer practicable critical path method (CPM) progress schedules in conformance with these special provisions. Whenever the term "schedule" is used in this section it shall mean CPM progress schedule.

Attention is directed to "Payments" of Section 5 of these special provisions.

The provisions in Section 8-1.04, "Progress Schedule," of the Standard Specifications shall not apply.

DEFINITIONS

The following definitions shall apply to this section:

- A. **ACTIVITY.**—A task, event or other project element on a schedule that contributes to completing the project. Activities have a description, start date, finish date, duration and one or more logic ties.

- B. **BASELINE SCHEDULE.**—The initial schedule representing the Contractor's work plan on the first working day of the project.
- C. **CONTRACT COMPLETION DATE.**—The current extended date for completion of the contract shown on the weekly statement of working days furnished by the Engineer in conformance with the provisions in Section 8-1.06, "Time of Completion," of the Standard Specifications.
- D. **CRITICAL PATH.**—The longest continuous chain of activities for the project that has the least amount of total float of all chains. In general, a delay on the critical path will extend the scheduled completion date.
- E. **CRITICAL PATH METHOD (CPM).**—A network based planning technique using activity durations and the relationships between activities to mathematically calculate a schedule for the entire project.
- F. **DATA DATE.**—The day after the date through which a schedule is current. Everything occurring earlier than the data date is "as-built" and everything on or after the data date is "planned."
- G. **EARLY COMPLETION TIME.**—The difference in time between an early scheduled completion date and the contract completion date.
- H. **FLOAT.**—The difference between the earliest and latest allowable start or finish times for an activity.
- I. **MILESTONE.**—An event activity that has zero duration and is typically used to represent the beginning or end of a certain stage of the project.
- J. **NARRATIVE REPORT.**—A document submitted with each schedule that discusses topics related to project progress and scheduling.
- K. **NEAR CRITICAL PATH.**—A chain of activities with total float exceeding that of the critical path but having no more than 10 working days of total float.
- L. **SCHEDULED COMPLETION DATE.**—The planned project finish date shown on the current accepted schedule.
- M. **STATE OWNED FLOAT ACTIVITY.**—The activity documenting time saved on the critical path by actions of the State. It is the last activity prior to the scheduled completion date.
- N. **TIME IMPACT ANALYSIS.**—A schedule and narrative report developed specifically to demonstrate what effect a proposed change or delay has on the current scheduled completion date.
- O. **TOTAL FLOAT.**—The amount of time that an activity or chain of activities can be delayed before extending the scheduled completion date.
- P. **UPDATE SCHEDULE.**—A current schedule developed from the baseline or subsequent schedule through regular monthly review to incorporate as-built progress and any planned changes.

GENERAL REQUIREMENTS

The Contractor shall submit to the Engineer baseline, monthly update and final update schedules, each consistent in all respects with the time and order of work requirements of the contract. The project work shall be executed in the sequence indicated on the current accepted schedule.

Schedules shall show the order in which the Contractor proposes to carry out the work with logical links between time-scaled work activities, and calculations made using the critical path method to determine the controlling operation or operations. The Contractor is responsible for assuring that all activity sequences are logical and that each schedule shows a coordinated plan for complete performance of the work.

The Contractor shall produce schedules using computer software and shall furnish compatible software for the Engineer's exclusive possession and use. The Contractor shall furnish network diagrams, narrative reports, tabular reports and schedule data as parts of each schedule submittal.

Schedules shall include, but not be limited to, activities that show the following that are applicable to the project:

- A. Project characteristics, salient features, or interfaces, including those with outside entities, that could affect time of completion.
- B. Project start date, scheduled completion date and other milestones.
- C. Work performed by the Contractor, subcontractors and suppliers.
- D. Submittal development, delivery, review and approval, including those from the Contractor, subcontractors and suppliers.
- E. Procurement, delivery, installation and testing of materials, plants and equipment.
- F. Testing and settlement periods.
- G. Utility notification and relocation.
- H. Erection and removal of falsework and shoring.
- I. Major traffic stage switches.
- J. Finishing roadway and final cleanup.
- K. State-owned float as the predecessor activity to the scheduled completion date.

Schedules shall have not less than 50 and not more than 500 activities, unless otherwise authorized by the Engineer. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts.

Schedule activities shall include the following:

- A. A clear and legible description.
- B. Start and finish dates.
- C. A duration of not less than one working day, except for event activities, and not more than 20 working days, unless otherwise authorized by the Engineer.
- D. At least one predecessor and one successor activity, except for project start and finish milestones.
- E. Required constraints.
- F. Codes for responsibility, stage, work shifts, location and contract pay item numbers.

The Contractor may show early completion time on any schedule provided that the requirements of the contract are met. Early completion time shall be considered a resource for the exclusive use of the Contractor. The Contractor may increase early completion time by improving production, reallocating resources to be more efficient, performing sequential activities concurrently or by completing activities earlier than planned. The Contractor may also submit for approval a cost reduction incentive proposal in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications that will reduce time of construction.

The Contractor may show a scheduled completion date that is later than the contract completion date on an update schedule, after the baseline schedule is accepted. The Contractor shall provide an explanation for a late scheduled completion date in the narrative report that is included with the schedule.

State-owned float shall be considered a resource for the exclusive use of the State. The Engineer may accrue State-owned float by the early completion of review of any type of required submittal when it saves time on the critical path. The Contractor shall prepare a time impact analysis, when requested by the Engineer, to determine the effect of the action in conformance with the provisions in "Time Impact Analysis" specified herein. The Engineer will document State-owned float by directing the Contractor to update the State-owned float activity on the next update schedule. The Contractor shall include a log of the action on the State-owned float activity and include a discussion of the action in the narrative report. The Engineer may use State-owned float to mitigate past, present or future State delays by offsetting potential time extensions for contract change orders.

The Engineer may adjust contract working days for ordered changes that affect the scheduled completion date, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications. The Contractor shall prepare a time impact analysis to determine the effect of the change in conformance with the provisions in "Time Impact Analysis" specified herein, and shall include the impacts acceptable to the Engineer in the next update schedule. Changes that do not affect the controlling operation on the critical path will not be considered as the basis for a time adjustment. Changes that do affect the controlling operation on the critical path will be considered by the Engineer in decreasing time or granting an extension of time for completion of the contract. Time extensions will only be granted if the total float is absorbed and the scheduled completion date is delayed one or more working days because of the ordered change.

The Engineer's review and acceptance of schedules shall not waive any contract requirements and shall not relieve the Contractor of any obligation thereunder or responsibility for submitting complete and accurate information. Schedules that are rejected shall be corrected by the Contractor and resubmitted to the Engineer within 5 working days of notification by the Engineer, at which time a new review period of one week will begin.

Errors or omissions on schedules shall not relieve the Contractor from finishing all work within the time limit specified for completion of the contract. If, after a schedule has been accepted by the Engineer, either the Contractor or the Engineer discover that any aspect of the schedule has an error or omission, it shall be corrected by the Contractor on the next update schedule.

COMPUTER SOFTWARE

The Contractor shall submit to the Engineer for approval a description of proposed software before delivery. The software shall be the current version of Primavera SureTrak Project Manager for Windows, or equal, and shall be compatible with Windows NT (version 4.0) operating system. If software other than SureTrak is proposed, it shall be capable of generating files that can be imported into SureTrak.

The Contractor shall furnish schedule software and all original software instruction manuals to the Engineer with submittal of the baseline schedule. The furnished schedule software shall become the property of the State and will not be returned to the Contractor. The State will compensate the Contractor in conformance with the provisions in Section 4-1.03, "Extra Work," of the Standard Specifications for replacement of software which is damaged, lost or stolen after delivery to the Engineer.

The Contractor shall instruct the Engineer in the use of the software and provide software support until the contract is accepted. Within 20 working days of contract approval, the Contractor shall provide a commercial 8-hour training session for 2 Department employees in the use of the software at a location acceptable to the Engineer. It is recommended that the Contractor also send at least 2 employees to the same training session to facilitate development of similar knowledge and skills in the use of the software. If software other than SureTrak is furnished, then the training session shall be a total of 16-hours for each Department employee.

NETWORK DIAGRAMS, REPORTS AND DATA

The Contractor shall include the following for each schedule submittal:

- A. Two sets of originally plotted, time-scaled network diagrams.
- B. Two copies of a narrative report.
- C. Two copies of each of 3 sorts of the CPM software-generated tabular reports.
- D. One 1.44-megabyte 90 mm (3.5 inch) floppy diskette containing the schedule data.

The time-scaled network diagrams shall conform to the following:

- A. Show a continuous flow of information from left to right.
- B. Be based on early start and early finish dates of activities.
- C. Clearly show the primary paths of criticality using graphical presentation.
- D. Be prepared on E-size sheets, 860 mm x 1120 mm (34 inch x 44 inch).
- E. Include a title block and a timeline on each page.

The narrative report shall be organized in the following sequence with all applicable documents included:

- A. Contractor's transmittal letter.
- B. Work completed during the period.
- C. Identification of unusual conditions or restrictions regarding labor, equipment or material; including multiple shifts, 6-day work weeks, specified overtime or work at times other than regular days or hours.
- D. Description of the current critical path.
- E. Changes to the critical path and scheduled completion date since the last schedule submittal.
- F. Description of problem areas.
- G. Current and anticipated delays:
 - 1. Cause of delay.
 - 2. Impact of delay on other activities, milestones and completion dates.
 - 3. Corrective action and schedule adjustments to correct the delay.
- H. Pending items and status thereof:
 - 1. Permits
 - 2. Change orders
 - 3. Time adjustments
 - 4. Non-compliance notices
- I. Reasons for an early or late scheduled completion date in comparison to the contract completion date.

Tabular reports shall be software-generated and provide information for each activity included in the project schedule. Three different reports shall be sorted by (1) activity number, (2) early start and (3) total float. Tabular reports shall be 215 mm x 280 mm (8 1/2 inch x 11 inch) in size and shall include, as a minimum, the following applicable information:

- A. Data date
- B. Activity number and description
- C. Predecessor and successor activity numbers and descriptions
- D. Activity codes
- E. Scheduled, or actual and remaining durations (work days) for each activity
- F. Earliest start (calendar) date
- G. Earliest finish (calendar) date

- H. Actual start (calendar) date
- I. Actual finish (calendar) date
- J. Latest start (calendar) date
- K. Latest finish (calendar) date
- L. Free float (work days)
- M. Total float (work days)
- N. Percentage of activity complete and remaining duration for incomplete activities.
- O. Lags
- P. Required constraints

Schedule submittals will only be considered complete when all documents and data have been provided as described above.

PRE-CONSTRUCTION SCHEDULING CONFERENCE

The Contractor shall schedule and the Engineer will conduct a pre-construction scheduling conference with the Contractor's project manager and construction scheduler within 10 working days of the approval of the contract. At this meeting the Engineer will review the requirements of this section of the special provisions with the Contractor.

The Contractor shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations and shall be prepared to discuss the proposed work plan and schedule methodology that comply with the requirements of these special provisions. If the Contractor proposes deviations to the construction staging of the project, then the general time-scaled logic diagram shall also display the deviations and resulting time impacts. The Contractor shall be prepared to discuss the proposal.

At this meeting, the Contractor shall additionally submit the alphanumeric coding structure and the activity identification system for labeling the work activities. To easily identify relationships, each activity description shall indicate its associated scope or location of work by including such terms as quantity of material, type of work, bridge number, station to station location, side of highway (such as left, right, northbound, southbound), lane number, shoulder, ramp name, ramp line descriptor or mainline.

The Engineer will review the logic diagram, coding structure, and activity identification system, and provide any required baseline schedule changes to the Contractor for implementation.

BASELINE SCHEDULE

Beginning the week following the pre-construction scheduling conference, the Contractor shall meet with the Engineer weekly until the baseline schedule is accepted by the Engineer to discuss schedule development and resolve schedule issues.

The Contractor shall submit to the Engineer a baseline schedule within 20 working days of approval of the contract. The Contractor shall allow 3 weeks for the Engineer's review after the baseline schedule and all support data are submitted. In addition, the baseline schedule submittal will not be considered complete until the computer software is delivered and installed for use in review of the schedule.

The baseline schedule shall include the entire scope of work and how the Contractor plans to complete all work contemplated. The baseline schedule shall show the activities that define the critical path. Multiple critical paths and near-critical paths shall be kept to a minimum. A total of not more than 50 percent of the baseline schedule activities shall be critical or near critical, unless otherwise authorized by the Engineer.

The baseline schedule shall not extend beyond the number of working days specified in these special provisions. The baseline schedule shall have a data date of the first working day of the contract and not include any completed work to date. The baseline schedule shall not attribute negative float or negative lag to any activity.

If the Contractor submits an early completion baseline schedule that shows contract completion in less than 85 percent of the working days specified in these special provisions, the baseline schedule shall be supplemented with resource allocations for every task activity and include time-scaled resource histograms. The resource allocations shall be shown to a level of detail that facilitates report generation based on labor crafts and equipment classes for the Contractor and subcontractors. The Contractor shall use average composite crews to display the labor loading of on-site construction activities. The Contractor shall optimize and level labor to reflect a reasonable plan for accomplishing the work of the contract and to assure that resources are not duplicated in concurrent activities. The time-scaled resource histograms shall show labor crafts and equipment classes to be utilized on the contract. The Engineer may review the baseline schedule activity resource allocations using Means Productivity Standards or equivalent to determine if the schedule is practicable.

UPDATE SCHEDULE

The Contractor shall submit an update schedule and meet with the Engineer to review contract progress, on or before the first day of each month, beginning one month after the baseline schedule is accepted. The Contractor shall allow 2 weeks for the Engineer's review after the update schedule and all support data are submitted, except that the review period shall not start until the previous month's required schedule is accepted. Update schedules that are not accepted or rejected within the review period will be considered accepted by the Engineer.

The update schedule shall have a data date of the twenty-first day of the month or other date established by the Engineer. The update schedule shall show the status of work actually completed to date and the work yet to be performed as planned. Actual activity start dates, percent complete and finish dates shall be shown as applicable. Durations for work that has been completed shall be shown on the update schedule as the work actually occurred, including Engineer submittal review and Contractor resubmittal times.

The Contractor may include modifications such as adding or deleting activities or changing activity constraints, durations or logic that do not (1) alter the critical path(s) or near critical path(s) or (2) extend the scheduled completion date compared to that shown on the current accepted schedule. The Contractor shall state in writing the reasons for any changes to planned work. If any proposed changes in planned work will result in (1) or (2) above, then the Contractor shall submit a time impact analysis as described herein.

TIME IMPACT ANALYSIS

The Contractor shall submit a written time impact analysis (TIA) to the Engineer with each request for adjustment of contract time, or when the Contractor or Engineer consider that an approved or anticipated change may impact the critical path or contract progress.

The TIA shall illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate. The analysis shall use the accepted schedule that has a data date closest to and prior to the event. If the Engineer determines that the accepted schedule used does not appropriately represent the conditions prior to the event, the accepted schedule shall be updated to the day before the event being analyzed. The TIA shall include an impact schedule developed from incorporating the event into the accepted schedule by adding or deleting activities, or by changing durations or logic of existing activities. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the accepted schedule, the difference between scheduled completion dates of the two schedules shall be equal to the adjustment of contract time. The Engineer may construct and utilize an appropriate project schedule or other recognized method to determine adjustments in contract time until the Contractor provides the TIA.

The Contractor shall submit a TIA in duplicate within 15 working days of receiving a written request for a TIA from the Engineer. The Contractor shall allow the Engineer 2 weeks after receipt to approve or reject the submitted TIA. All approved TIA schedule changes shall be shown on the next update schedule.

If a TIA submitted by the Contractor is rejected by the Engineer, the Contractor shall meet with the Engineer to discuss and resolve issues related to the TIA. If agreement is not reached, the Contractor will be allowed 15 days from the meeting with the Engineer to give notice in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications. The Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update schedules. If agreement is reached at a later date, approved TIA schedule changes shall be shown on the next update schedule. The Engineer will withhold remaining payment on the schedule contract item if a TIA is requested by the Engineer and not submitted by the Contractor within 15 working days. The schedule item payment will resume on the next estimate after the requested TIA is submitted. No other contract payment will be retained regarding TIA submittals.

FINAL UPDATE SCHEDULE

The Contractor shall submit a final update, as-built schedule with actual start and finish dates for the activities, within 30 days after completion of contract work. The Contractor shall provide a written certificate with this submittal signed by the Contractor's project manager and an officer of the company stating, "To my knowledge and belief, the enclosed final update schedule reflects the actual start and finish dates of the actual activities for the project contained herein." An officer of the company may delegate in writing the authority to sign the certificate to a responsible manager.

RETENTION

The Department will retain an amount equal to 25 percent of the estimated value of the work performed during each estimate period in which the Contractor fails to submit an acceptable schedule conforming to the requirements of these special provisions as determined by the Engineer. Schedule retentions will be released for payment on the next monthly estimate for partial payment following the date that acceptable schedules are submitted to the Engineer or as otherwise specified herein. Upon completion of all contract work and submittal of the final update schedule and certification, any remaining retained funds associated with this section, "Progress Schedule (Critical Path Method)", will be released for payment. Retentions held in conformance with this section shall be in addition to other retentions provided for in the contract. No interest will be due the Contractor on retention amounts.

PAYMENT

Progress schedule (critical path method) will be paid for at a lump sum price. The contract lump sum price paid for progress schedule (critical path method) shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, including computer software, and for doing all the work involved in preparing, furnishing, and updating schedules, and instructing and assisting the Engineer in the use of computer software, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Payments for the progress schedule (critical path method) contract item will be made progressively as follows:

- A. A total of 25 percent of the item amount or a total of 25 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon achieving all of the following:
 1. Completion of 5 percent of all contract item work.
 2. Acceptance of all schedules and TIAs required to the time when 5 percent of all contract item work is complete.
 3. Delivery of schedule software to the Engineer.
 4. Completion of required schedule software training.
- B. A total of 50 percent of the item amount or a total of 50 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of 25 percent of all contract item work and acceptance of all schedules and TIAs required to the time when 25 percent of all contract item work is complete.
- C. A total of 75 percent of the item amount or a total of 75 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of 50 percent of all contract item work and acceptance of all schedules and TIAs required to the time when 50 percent of all contract item work is complete.
- D. A total of 100 percent of the item amount or a total of 100 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of all contract item work, acceptance of all schedules and TIAs required to the time when all contract item work is complete, and submittal of the certified final update schedule.

If the Contractor fails to complete any of the work or provide any of the schedules required by this section, the Engineer shall make an adjustment in compensation in conformance with the provisions in Section 4-1.03C, "Changes in Character of Work," of the Standard Specifications for the work not performed. Adjustments in compensation for schedules will not be made for any increased or decreased work ordered by the Engineer in furnishing schedules.

10-1.07 TIME-RELATED OVERHEAD

The Contractor will be compensated for time-related overhead in conformance with these special provisions.

Attention is directed to "Beginning of Work, Time of Completion and Liquidated Damages," "Force Account Payment," and "Progress Schedule (Critical Path Method)" of these special provisions.

The provisions in Section 9-1.08, "Adjustment of Overhead Costs," of the Standard Specifications shall not apply.

Time-related overhead shall consist of those overhead costs, including field and home office overhead, that are in proportion to the time required to complete the work. Time-related overhead shall not include costs that are not related to time, including but not limited to, mobilization, licenses, permits, and other charges incurred only once during the contract.

Field office overhead expenses include time-related costs associated with the normal and recurring operations of the construction project, and shall not include costs directly attributable to the work of the contract. Time-related costs of field office overhead include, but are not limited to, salaries, benefits, and equipment costs of project managers, general superintendents, field office managers and other field office staff assigned to the project, and rent, utilities, maintenance, security, supplies, and equipment costs of the project field office.

Home office overhead or general and administrative expenses refer to the fixed costs of operating the Contractor's business. These costs include, but are not limited to, general administration, insurance, personnel and subcontract administration, purchasing, accounting, and project engineering and estimating. Home office overhead costs shall exclude expenses specifically related to other contracts or other businesses of the Contractor, equipment coordination, material deliveries, and consultant and legal fees.

The quantity of time-related overhead associated with a reduction in contract time for cost reduction incentive proposals accepted and executed in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications shall be considered a construction cost attributable to the resultant estimated net savings due to the cost reduction incentive.

If the final increased quantity of time-related overhead exceeds 149 percent of the number of working days specified in the Engineer's Estimate, the Contractor shall, within 60 days of the Engineer's written request, submit to the Engineer an audit examination and report performed by an independent Certified Public Accountant of the Contractor's actual overhead costs. The independent Certified Public Accountant's audit examination shall be performed in conformance with the requirements of the American Institute of Certified Public Accountants Attestation Standards. The audit examination and report shall depict the Contractor's project and company-wide financial records and shall specify the actual overall average daily rates for both field and home office overhead for the entire duration of the project, and whether the costs have been properly allocated. The rates of field and home office overhead shall exclude unallowable costs as determined in the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31. The audit examination and report shall determine if the rates of field office overhead and home office overhead are:

- A. Allowable in conformance with the requirements of the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31.
- B. Adequately supported by reliable documentation.
- C. Related solely to the project under examination.

Within 20 days of the Engineer's written request, the Contractor shall make its financial records available for audit by the State for the purpose of verifying the actual rate of time-related overhead specified in the audit submitted by the Contractor. The actual rate of time-related overhead specified in the audit, submitted by the Contractor, will be subject to approval by the Engineer.

If the Engineer requests the independent Certified Public Accountant audit, or if it is requested in writing by the Contractor, the contract item payment rate for time-related overhead, in excess of 149 percent of the number of working days specified in the Engineer's Estimate, will be adjusted to reflect the actual rate.

The cost of performing an independent Certified Public Accountant audit examination and submitting the report, requested by the Engineer, will be borne equally by the State and the Contractor. The division of the cost will be made by determining the cost of providing an audit examination and report in conformance with the provisions of Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the Standard Specifications, and paying to the Contractor one-half of that cost. The cost of performing an audit examination and submitting the independent Certified Public Accountant audit report for overhead claims other than for the purpose of verifying the actual rate of time-related overhead shall be entirely borne by the Contractor.

The quantity of time-related overhead to be paid will be measured by the working day, designated in the Engineer's Estimate as WDAY. The estimated number of working days is the number of working days, excluding days for plant establishment, as specified in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions. The quantity of time-related overhead will be increased or decreased only as a result of suspensions or adjustments of contract time which revise the current contract completion date, and which satisfy any of the following criteria:

- A. Suspensions of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications, except:
 - 1. Suspensions ordered due to weather conditions being unfavorable for the suitable prosecution of the controlling operation or operations.
 - 2. Suspensions ordered due to the failure on the part of the Contractor to carry out orders given, or to perform the provisions of the contract.
 - 3. Other suspensions mutually agreed upon between the Engineer and the Contractor.
- B. Extensions of contract time granted by the State in conformance with the provisions in the fifth paragraph in Section 8-1.07, "Liquidated Damages," of the Standard Specifications and set forth in approved contract change orders, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications.
- C. Reductions in contract time set forth in approved contract change orders, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications.

In the event an early completion progress schedule, as defined in "Progress Schedule (Critical Path Method)" of these special provisions, is submitted by the Contractor and approved by the Engineer, the amount of time-related overhead eligible for payment will be based on the total number of working days for the project, in conformance with the provisions in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions, rather than the Contractor's early completion progress schedule.

The contract price paid per working day for time-related overhead shall include full compensation for time-related overhead, including the Contractor's share of costs of the independent Certified Public Accountant audit of overhead costs requested by the Engineer, as specified in these special provisions, and as directed by the Engineer.

The provisions in Sections 4-1.03B, "Increased or Decreased Quantities," and 4-1.03C, "Changes in Character of the Work," of the Standard Specifications shall not apply to the contract item of time-related overhead.

Full compensation for additional overhead costs incurred during days of inclement weather when the contract work is extended into additional construction seasons due to delays caused by the State shall be considered as included in the time-related overhead paid during the contract working days, and no additional compensation will be allowed therefor.

Full compensation for additional overhead costs involved in performing additional contract item work that is not a controlling operation shall be considered as included in the contract items of work involved and no additional compensation will be allowed therefor.

Full compensation for overhead, other than time-related overhead measured and paid for as specified above, and other than overhead costs included in the markups specified in "Force Account Payment" of these special provisions, shall be considered as included in the various items of work and no additional compensation will be allowed therefor.

Overhead costs incurred by joint venture partners, subcontractors, suppliers or other parties associated with the Contractor shall be considered as included in the various overhead costs for which the Contractor is compensated, and no additional compensation will be allowed therefor.

For the purpose of making partial payments pursuant to the provisions in Section 9-1.06, "Partial Payments," of the Standard Specifications, the number of working days to be paid for time-related overhead in each monthly partial payment will be the number of working days, specified above to be measured for payment that occurred during that monthly estimate period, including compensable suspensions and right of way delays. Working days granted by contract change order due to extra work or changes in character of the work, will be paid for upon completion of the contract. The amount earned per working day for time-related overhead shall be the lesser of the following amounts:

- A) The contract item price.
- B) Twenty percent of the original total contract amount divided by the number of working days specified in "Beginning of Work, Time of Completion and Liquidated Damages," of these special provisions.

10-1.08 OBSTRUCTIONS

Attention is directed to Section 8-1.10, "Utility and Non-Highway Facilities," and Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Attention is directed to the existence of certain underground facilities that may require special precautions be taken by the Contractor to protect the health, safety and welfare of workers and of the public. Facilities requiring special precautions include, but are not limited to: conductors of petroleum products, oxygen, chlorine, and toxic or flammable gases; natural gas in pipelines greater than 150 mm in diameter or pipelines operating at pressures greater than 415 kPa (gage); underground electric supply system conductors or cables, with potential to ground of more than 300 V, either directly buried or in a duct or conduit which do not have concentric grounded or other effectively grounded metal shields or sheaths.

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure. Regional notification centers include, but are not limited to, the following:

Notification Center	Telephone Number
Underground Service Alert-Northern California (USA)	1-800-642-2444 1-800-227-2600
Underground Service Alert-Southern California (USA)	1-800-422-4133 1-800-227-2600

10-1.09 OBSTRUCTIONS

Attention is directed to Section 8-1.10, "Utility and Non-Highway Facilities," Section 15, "Existing Highway Facilities," and Section 51-1.19, "Utility Facilities," of the Standard Specifications and these special provisions.

The utility facilities listed in the following table will be arranged during construction operations to permit the pile drilling operations and the substructure construction. It is anticipated that no other utility facilities will be rearranged or temporarily deactivated in advance of or during construction operations to permit pile driving or drilling operations or substructure construction, unless the Contractor makes the necessary arrangements as provided in Section 8-1.10:

Utility Facility	Location
Pacific Bell telephone conduit	Relocated from approximately 9.9 meters left of Station 19+81+/- at center line of Third Street to approximately 2.7 meters away from abutment footing
Sewer line in 1070 mm encasement	At Retaining Wall 137c, 18.3 meters left of the Spruce Street center line, perpendicular to wall layout line, 610 mm under the bottom on footing

The Contractor shall notify the Engineer in writing at least 30 days in advance of the date or dates that the interfering utility facilities are to be rearranged. The Engineer will, in turn, notify the owners of the utility facilities.

The utility facilities listed in the following table, and other utility facilities that possibly exist at locations which might interfere with the pile drilling operations or substructure construction, will not be rearranged in advance of or during construction operations. Should the Contractor desire to have any of the utility facilities rearranged or temporarily deactivated for his convenience, the Contractor shall make the necessary arrangements as provided in Section 8-1.10:

Utility Facility	Location
Existing manhole	7.9 meters left of Station 19+70+/- at centerline of Third Street
300 mm waterline	Approximately Station 130+28 at center line of Route 91
480 mm electrical conduit	Mission Inn Under Crossing (Bridge Number 56-315), East widening, near the corner of abutment 1

Full compensation for conforming to the requirements of this section, not otherwise provided for, shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

10-1.10 MOBILIZATION

Mobilization shall conform to the provisions in Section 11, "Mobilization," of the Standard Specifications.

10-1.11 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

Flagging, signs, and all other traffic control devices furnished, installed, maintained, and removed when no longer required shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Category 1 traffic control devices are defined as those devices that are small and lightweight (less than 45 kg), and have been in common use for many years. The devices shall be known to be crashworthy by crash testing, crash testing of similar devices, or years of demonstrable safe performance. Category 1 traffic control devices include traffic cones, plastic drums, portable delineators, and channelizers.

If requested by the Engineer, the Contractor shall provide written self-certification for crashworthiness of Category 1 traffic control devices. Self-certification shall be provided by the manufacturer or Contractor and shall include the following: date, Federal Aid number (if applicable), expenditure authorization, district, county, route and kilometer post of project limits; company name of certifying vendor, street address, city, state and zip code; printed name, signature and title of certifying person; and an indication of which Category 1 traffic control devices will be used on the project. The Contractor may obtain a standard form for self-certification from the Engineer.

Category 2 traffic control devices are defined as those items that are small and lightweight (less than 45 kg), that are not expected to produce significant vehicular velocity change, but may otherwise be potentially hazardous. Category 2 traffic control devices include: barricades and portable sign supports.

Category 2 devices purchased on or after October 1, 2000 shall be on the Federal Highway Administration (FHWA) Acceptable Crashworthy Category 2 Hardware for Work Zones list. This list is maintained by FHWA and can be located at the following internet address: <http://safety.fhwa.dot.gov/fourthlevel/hardware/listing.cfm?code=workzone>. The Department maintains a secondary list at the following internet address: <http://www.dot.ca.gov/hq/traffops/signtech/signdel/pdf/files.htm>.

Category 2 devices that have not received FHWA acceptance, and were purchased before October 1, 2000, may continue to be used until they complete their useful service life or until January 1, 2003, whichever comes first. Category 2 devices in use that have received FHWA acceptance shall be labeled with the FHWA acceptance letter number and the name of the manufacturer by the start of the project. The label shall be readable. After January 1, 2003, all Category 2 devices without a label shall not be used on the project.

If requested by the Engineer, the Contractor shall provide a written list of Category 2 devices to be used on the project at least 5 days prior to beginning any work using the devices. For each type of device, the list shall indicate the FHWA acceptance letter number and the name of the manufacturer.

Full compensation for providing self-certification for crashworthiness of Category 1 traffic control devices and for providing a list of Category 2 devices used on the project and labeling Category 2 devices as specified shall be considered as included in the prices paid for the various contract items of work requiring the use of the Category 1 or Category 2 traffic control devices and no additional compensation will be allowed therefor.

10-1.12 CONSTRUCTION AREA SIGNS

Construction area signs shall be furnished, installed, maintained, and removed when no longer required in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. Type II retroreflective sheeting shall not be used on construction area sign panels.

Attention is directed to "Construction Project Information Signs" of these special provisions regarding the number and type of construction project information signs to be furnished, erected, maintained, and removed and disposed of.

The Contractor shall notify the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to commencing excavation for construction area sign posts. The regional notification centers include, but are not limited to, the following:

Notification Center	Telephone Number
Underground Service Alert-Northern California (USA)	1-800-642-2444 1-800-227-2600
Underground Service Alert-Southern California (USA)	1-800-422-4133 1-800-227-2600

Excavations required to install construction area signs shall be performed by hand methods without the use of power equipment, except that power equipment may be used if it is determined there are no utility facilities in the area of the proposed post holes.

Sign substrates for stationary mounted construction area signs may be fabricated from fiberglass reinforced plastic as specified under "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

The Contractor may be required to cover certain signs during the progress of the work. Signs that are no longer required or that convey inaccurate information to the public shall be immediately covered or removed, or the information shall be corrected. Covers for construction area signs shall be of sufficient size and density to completely block out the complete face of the signs. The retroreflective face of the covered signs shall not be visible either during the day or at night. Covers shall be fastened securely so that the signs remain covered during inclement weather. Covers shall be replaced when they no longer cover the signs properly.

The term "construction area signs" shall include temporary object markers required for the direction of public traffic through or around the work during construction. Object markers listed or designated on the plans as construction area signs shall be considered to be signs and shall be furnished, erected, maintained, and removed by the Contractor in the same manner specified for construction area signs.

Object markers shall be stationary mounted on wood or metal posts in conformance with the details shown on the plans and the provisions in Section 82, "Markers and Delineators," of the Standard Specifications.

Marker panels for Type N object markers shall conform to the provisions for sign panels for stationary mounted signs.

Target plates for Type K and Type L object markers and posts, reflectors and hardware shall conform to the provisions in Section 82, but need not be new.

10-1.13 MAINTAINING TRAFFIC

Attention is directed to Sections 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction Area Traffic Control Devices," of the Standard Specifications and to the provisions in "Public Safety" of these special provisions and these special provisions. Nothing in these special provisions shall be construed as relieving the Contractor from the responsibilities specified in Section 7-1.09.

Lane closures shall conform to the provisions in section "Traffic Control System for Lane Closure" of these special provisions.

In addition to the provisions set forth in "Public Safety" of these special provisions, whenever work to be performed on the freeway traveled way (except the work of installing, maintaining and removing traffic control devices) is within 1.8 m of the adjacent traffic lane, the adjacent traffic lane shall be closed.

At locations where falsework pavement lighting or pedestrian openings through falsework are designated, falsework lighting shall be installed in conformance with the provisions in Section 86-6.11, "Falsework Lighting," of the Standard Specifications.

Openings shall be provided through bridge falsework for the use of public traffic at each location where falsework is constructed over the streets or routes listed in the following table. The type, minimum width, height, and number of openings at each location, and the location and maximum spacing of falsework lighting, if required for each opening, shall conform to the requirements in the table. The width of vehicular openings shall be the clear width between temporary railings or other protective work. The spacing shown for falsework pavement lighting is the maximum distance center to center in meters between fixtures.

Proposed Route 91
SPRUCE STREET OVERCROSSING
(Bridge Number 56-0800)

	Number	Width	Height
Vehicle Openings	2	18.3	4.8
	Location	Spacing	
Falsework Pavement Lighting	R and L	12 m	
	C	12 m staggered 1/2 space	

(Width and Height in meters)

(R = Right side of traffic. L = Left side of traffic)

(C = Centered overhead)

NE Conn
SPRUCE STREET OVERCROSSING
(Bridge Number 56-0800)

	Number	Width	Height
Vehicle Openings	1	9.6	4.6
	Location	Spacing	
Falsework Pavement Lighting	R and L	9 staggered 1/2 space	

(Width and Height in meters)

(R = Right side of traffic. L = Left side of traffic)

(C = Centered overhead)

The exact location of openings will be determined by the Engineer.

Personal vehicles of the Contractor's employees shall not be parked on the traveled way or shoulders including any section closed to public traffic.

The Contractor shall notify local authorities of the Contractor's intent to begin work at least 5 days before work is begun. The Contractor shall cooperate with local authorities relative to handling traffic through the area and shall make arrangements relative to keeping the working area clear of parked vehicles.

Whenever vehicles or equipment are parked on the shoulder within 1.8 m of a traffic lane, the shoulder area shall be closed as shown on the plans.

Lanes and ramps shall be closed only during the hours shown on the charts included in this section "Maintaining Traffic." Except work required under Sections 7-1.08 and 7-1.09, work that interferes with public traffic shall be performed only during the hours shown for lane closures.

No 2 consecutive entrance ramps or 2 consecutive exit ramps in the same direction of travel shall be closed concurrently.

Advance special message advisory signs shall be placed 10 calendar days in advance of the ramp closure. The Contractor shall notify the Engineer not less than 5 calendar days prior to installing the advance special message advisory signs for ramp closures.

Designated legal holidays are: January 1st, the third Monday in February, the last Monday in May, July 4th, the first Monday in September, November 11th, Thanksgiving Day, and December 25th. When a designated legal holiday falls on a Sunday, the following Monday shall be a designated legal holiday. When November 11th falls on a Saturday, the preceding Friday shall be a designated legal holiday. Refer to table "Z" and the list of special events elsewhere in these special provisions.

Minor deviations from the requirements of this section concerning hours of work which do not significantly change the cost of the work may be permitted upon the written request of the Contractor, if in the opinion of the Engineer, public traffic will be better served and the work expedited. These deviations shall not be adopted by the Contractor until the Engineer has approved the deviations in writing. Other modifications will be made by contract change order.

For local roads, whenever vehicles or equipment are parked on the shoulder within 1.8 m of a traffic lane, the shoulder area shall be closed with fluorescent traffic cones or portable delineators placed on a taper in advance of the parked vehicles or equipment and along the edge of the pavement at 7.5 m intervals to a point not less than 7.5 m past the last vehicle or piece of equipment. A minimum of 9 cones or portable delineators shall be used for the taper. A C23 (Road Work Ahead) or C24 (Shoulder Work Ahead) sign shall be mounted on a portable sign stand with flags. The sign shall be placed where designated by the Engineer.

For local roads, a minimum of one paved traffic lane, not less than 3.6 m wide, shall be open for use by public traffic in each direction of travel except for locations shown on the plans.

A minimum of one paved traffic lane, not less than 3.6 m wide, shall be open for use by public traffic. When construction operations are not actively in progress, not less than 2 of these lanes shall be open to public traffic. At the option of the Contractor, with the approval from the Engineer, reversible traffic control may be used at Vine St., Mulberry St. and Kansas St.

Chart No. 1 Multilane Lane Requirements																										
Location: EASTBOUND RIV 60 kp 18.6-19.3																										
FROM HOUR TO HOUR	a.m.												p.m.													
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11		12
Mondays through Thursdays	3	3	3	3	3																	3	3	3	3	
Fridays	3	3	3	3	3																3	3	3	3		
Saturdays																										
Sundays																										
Day before designated legal holiday																										
Designated legal holidays																										
Legend:																										
3	Three adjacent lanes open in direction of travel																									
	No lane closure allowed																									

REMARKS:

- A. Closures may not be allowed during certain upcoming special events.
- B. Working window may be modified, by the District Traffic Manager, during the Lane Closure approval process.
- C. The closure starts with the first cone down and ends with the last cone picked up. No closure sign(s) shall be exposed to traffic more than 30 minutes before or after a closure, except as otherwise indicated in the special provisions.
- D. The length of each closure shall not exceed 3 kilometers.
- E. In the same direction, consecutive closures shall be not less than 2 kilometers apart and lanes shall be closed on the same side of the roadbed.

Chart No. 2 Multilane Lane Requirements																									
Location: WESTBOUND RIV 91 kp 32.2-34.8																									
FROM HOUR TO HOUR	a.m.												p.m.												
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	1	1	1	1																					1
Fridays	1	1	1	1																					
Saturdays	1	1	1	1	1																				1
Sundays	1	1	1	1	1	1	1																		
Legend:																									
1 One lane open in direction of travel																									
No lane closure allowed																									
REMARKS:																									
A. Closures may not be allowed during certain upcoming special events.																									
B. Working window may be modified, by the District Traffic Manager, during the Lane Closure approval process.																									
C. The closure starts with the first cone down and ends with the last cone picked up. No closure sign(s) shall be exposed to traffic more than 30 minutes before or after a closure, except as otherwise indicated in the special provisions.																									
D. The length of each closure shall not exceed 3 kilometers.																									
E. In the same direction, consecutive closures shall be not less than 2 kilometers apart and lanes shall be closed on the same side of the roadbed.																									

Chart No. 3 Multilane Lane Requirements																									
Location: Riv91 KP32.2-34.8 EASTBOUND																									
FROM HOUR TO HOUR	a.m.											p.m.													
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	1	1	1	1	1																				1
Fridays	1	1	1	1	1																				
Saturdays	1	1	1	1	1	1																			1
Sundays	1	1	1	1	1	1	1	1																	
Legend:																									
1 One lane open in direction of travel																									
No lane closure allowed																									
Remarks:																									
1. Closures may not be allowed during certain upcoming special events.																									
2. Working window may be modified, by the District Traffic Manager, during the Lane Closure approval process.																									
3. The closure starts with the first cone down and ends with the last cone picked up. No closure sign (S) shall be exposed to traffic more than 30 minutes before or after a closure, except as otherwise indicated in the special provisions.																									
4. The length of each closure shall not exceed 3 kilometers.																									
5. In the same direction, consecutive closures shall be not less than 2 kilometers apart and lanes shall be closed on the same side of the roadbed.																									

Chart No. 4 Ramp Lane Requirements																										
Location: EASTBOUND & WESTBOUND RIV 91 KP 32.2-34.8																										
FROM HOUR TO HOUR	a.m.												p.m.													
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Mondays through Thursdays	X	X	X	X	X																				X	
Fridays	X	X	X	X	X																					
Saturdays	X	X	X	X	X	X																				
Sundays	X	X	X	X	X	X	X																		X	
Legend:																										
X Ramp may be closed																										
No work that interferes with public traffic will be allowed																										
REMARKS:																										
A. Closures may not be allowed during certain upcoming special events.																										
B. Working window may be modified, by the District Traffic Manager, during the Lane Closure approval process.																										
C. The closure starts with the first cone down and ends with the last cone picked up. No closure sign(s) shall be exposed to traffic more than 30 minutes before or after a closure, except as otherwise																										

indicated in the special provisions.

D. No two consecutive ramps to be closed simultaneously in each direction.

E. In interchanges, only one ONR (and only in one direction) will be closed at any time period.

**Chart No. 5
Ramp Lane Requirements**

Location: EASTBOUND & WESTBOUND RIV 60 KP 18.6-19.3

FROM HOUR TO HOUR	a.m.											p.m.													
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	X	X	X	X	X									X											X
Fridays	X	X	X	X	X																				
Saturdays	X	X	X	X	X	X																			
Sundays	X	X	X	X	X	X	X																		X

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

A. Closures may not be allowed during certain upcoming special events.

B. Working window may be modified, by the District Traffic Manager, during the Lane Closure approval process.

C. The closure starts with the first cone down and ends with the last cone picked up. No closure sign(s) shall be exposed to traffic more than 30 minutes before or after a closure, except as otherwise indicated in the special provisions.

D. No two consecutive ramps to be closed simultaneously in each direction.

E. In interchanges, only one ONR (and only in one direction) will be closed at any time period.

**Chart No. 6
Multilane Lane Requirements**

Location: 3RD. ST., MISSION ST., UNIVERSITY AVE., MAIN ST., CONNECTOR RD.

	a.m.											p.m.													
FROM HOUR TO HOUR	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Mondays through Thursdays	1	1	1	1	1	1															1	1	1	1	
Fridays	1	1	1	1	1	1																			
Saturdays																									
Sundays																					1	1	1	1	

Legend:

1 One lane open in direction of travel

No lane closure allowed

REMARKS:

A. Closures may not be allowed during certain upcoming special events.

B. Working window may be modified, by the District Traffic Manager, during the Lane Closure approval

process.

- C. The closure starts with the first cone down and ends with the last cone picked up. No closure sign(s) shall be exposed to traffic more than 30 minutes before or after a closure, except as otherwise indicated in the special provisions.
- D. The length of each closure shall not exceed 3 kilometers.
- E. **In the same direction**, consecutive closures shall be not less than 2 kilometers apart and lanes shall be closed on the same side of the roadbed.

Chart No. 7 Two-Lane Conventional Highway Lane Requirements																										
Location: VINE ST., KANSAS ST., MULBERRY ST., ORANGE ST.																										
FROM HOUR TO HOUR	a.m.											p.m.														
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9		10	11	12
Mondays through Thursdays	R	R	R	R	R	R																	R	R	R	R
Fridays	R	R	R	R	R	R																				
Saturdays																										
Sundays																							R	R	R	R
Legend: <div style="display: flex; border-bottom: 1px solid black; margin-bottom: 5px;"> <div style="width: 20px; text-align: center; border-bottom: 1px solid black;">R</div> <div>A minimum of one paved traffic lane, not less than 3.3m wide, shall be open for use by public traffic. (Reversing Control).</div> </div> <div style="display: flex; border-bottom: 1px solid black; margin-bottom: 5px;"> <div style="width: 20px; text-align: center; border-bottom: 1px solid black;"></div> <div>No work that interferes with public traffic will be allowed</div> </div>																										
REMARKS: A. Closures may not be allowed during certain upcoming special events. B. Working window may be modified, by the District Traffic Manager, during the Lane Closure approval process. C. The closure starts with the first cone down and ends with the last cone picked up. No closure sign(s) shall be exposed to traffic more than 30 minutes before or after a closure, except as otherwise indicated in the special provisions. D. Maximum closure length to be under 2.4 kilometers.																										

No work that encroaches onto the traveled ways shall be allowed from 3 hours before to 2 hours following special events, or games listed below, unless otherwise permitted by the Engineer.

Venue/Special Event	Affected Routes	Route Limits	Tele. No. of Sponsored Organization
Glen Helen Blockbuster Pavilion	215 66 210 15	University Parkway to I-15/215 Connector*** Haven Ave. to I-15 * Haven Ave. to I-15 Connector* I-60 to Devore Road**	(909) 880-6500
Route 66 Rendezvous	215 66	Mill street to Fifth street** I-215 to E street*	(909) 889-3980
Oak Glen Apple Blossom Festival	10	Yucaipa Blvd. Off ramps*	(909) 797-6833
California Speedway	10 15 210 66 60	I-57 to I-15/10 Connector and I-215/10 to Cherry Ave.*** I-215/15 @ Devore to I-10/15 Connector and I-91/15 to I-10/15 Connector*** Haven Ave. to Cherry and I-215 to Cherry*** Haven to Cherry Ave.*** I-15 to L.A. County Line***	(909) 429-5000
Renaissance Pleasure Faire (in Glen Helen Regional Park)	15 215	Devore Road off ramp* Devore Road off ramp*	(800) 523-2473
Orange Blossom in Riverside	91	Off ramps at down town Riverside*	(909) 715-3400
Annual Oktoberfest in the city of Big Bear	330	Near down town in Big Bear*	(909) 585-3000
Harvest Faire	215	I-215/10 to Orange Show off Ramp in San Bernardino*	(909) 384-5426
Nascar Racing (in Orange Show Speedway in San Bernardino)	215	I-215/10 to Orange Show off Ramp in San Bernardino*	(909) 885-5757
Annual Citrus Harvest Festival	210	Highland Ave. off ramp in San Bernardino*	(909) 864-8732
Soap Box Derby Rally	215	Palm off ramp in San Bernardino*	(909) 887-8791
Redlands Bicycle Classic	10	10University off ramp*	(909) 798-0865
Fourth of July Celebrations	All	In San Bernardino and Riverside*	
March Air Force Base Air Show	215	Cactus Ave. off ramps in Riverside*	(909) 655-1110

Venue/Special Event	Affected Routes	Route Limits	Tele. No. of Sponsored Organization
Balloon and Wine Festival in Temecula	15	Rout 79 (Winchester Rd.) and Rancho California at both directions (15N & 15S) off ramps in Temecula**	(909) 694-6411
Golf Tournaments in Palm Springs Bob Hope Chrysler Classic Dinah Shore Classic (Nabisco Championship)	10	Palm Springs off ramp at Route RIV-111**	(909) 672-4673 (800) 455-4300

The dates of most of special events are changing every year. Telephone numbers of the sponsoring organizations are provided to check the exact date.

* **Low Impact** (5 minutes delay or less)
 ** **Medium Impact** (20 minutes delay or less)
 *** **High Impact** (30 minutes delay or more)

District 8's Table "Z"

Lane Closure Restrictions on designated Legal Holidays and Special Days/ Events												
If Holiday falls on	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon
Friday	x	H	xx	xx	x							
		xx										
Saturday	x	xx	H	xx	x							
			xx									
Sunday		x	xx	H	xx							
				xx								
Monday		xx	xx	xx	H	x						
					xx							
Tuesday					x	H						
						xx						
Wednesday						x	H					
							xx					
Thursday							x	H	xx		xx	xx
								xx				

H = Designated Legal Holiday

SD = Special Day/Event

Special Days: include Martin Luther King Day, Lincoln's Birthday, Cesar Chavez and Columbus Day. **No closure** is allowed on these days.

Special Events: See attached list.



Refer to Lane Closure Charts in the Special Provisions (if applicable)



Preceding the designated Holiday, the full width of the traveled way shall be open for use by public traffic **after 6 am**.
Following the designated Holiday, the full width of the traveled way shall be open for use by public traffic **until 6 pm**.



The full width of the traveled way shall be open for use by public traffic at **all times**.
No lane closures will be allowed.

Pedestrian access facilities shall be provided through construction areas within the right of way as shown on the plans and as specified herein. Pedestrian walkways shall be surfaced with asphalt concrete, portland cement concrete or timber. The surface shall be skid resistant and free of irregularities. Hand railings shall be provided on each side of pedestrian walkways as necessary to protect pedestrian traffic from hazards due to construction operations or adjacent vehicular traffic. Protective overhead covering shall be provided as necessary to insure protection from falling objects and drip from overhead structures.

In addition to the required openings through falsework, pedestrian facilities shall be provided during pile driving, footing, wall, and other bridge construction operations. At least one walkway shall be available at all times. If the Contractor's operations require the closure of one walkway, then another walkway shall be provided nearby, off the traveled roadway.

Railings shall be constructed of wood, S4S, and shall be painted white. Railings and walkways shall be maintained in good condition. Walkways shall be kept clear of obstructions.

Full compensation for providing pedestrian facilities shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

Precast concrete members shall not be cast, assembled or stored within the right of way of Route 91 or within the median or within 6 meters of the edge of pavement of University Avenue and Mission Inn Avenue. During work on the members, no workers, equipment or materials shall occupy any area within 1.2 m of the edge of the existing pavement except as permitted during lane closures.

Erection of girders over University Avenue, Mission Inn Avenue, and Third Street shall be undertaken on one span at a time. During girder erection, public traffic in the lanes over which girders are being placed shall be stopped for periods of time not to exceed 30 minutes. Following each time traffic is stopped, the accumulated traffic shall pass through the work before another closure is made.

Erection and removal of falsework at the Spruce Street Overcrossing shall be undertaken one span at a time. During falsework erection and removal, public traffic in the lanes over which falsework is being erected or removed shall be routed around the work area on adjacent by means of a local detour as shown on the plans. Erection shall include all adjustments or removal of falsework components prior to concrete placement that contribute to the horizontal stability of the falsework system. Removal shall include lowering falsework, blowing sand from sand jacks, turning screws on screw jacks, and removing wedges.

Erection and removal of falsework at University Avenue, Mission Inn Avenue, and Third Street shall be undertaken one location at a time. During falsework erection and removal, public traffic in the lanes over which falsework is being erected or removed shall be stopped for periods of time not to exceed 30 minutes. Following each time traffic is stopped, the accumulated traffic shall pass through the work before another closure is made. Erection shall include all adjustments or removal of falsework components prior to concrete placement that contribute to the horizontal stability of the falsework system. Removal shall include lowering falsework, blowing sand from sand jacks, turning screws on screw jacks and removing wedges.

Rerouting or stopping traffic during erection or removal of girders and falsework shall be undertaken only between the hours of 9:00 a.m. and 3:00 p.m., Monday through Friday, except designated legal holidays and days preceding designated legal holidays.

Regardless of the construction procedure, methods and equipment selected, the Contractor shall have necessary materials and equipment on the site to erect or remove the girders and falsework in any one span or over any one opening prior to detouring or stopping public traffic, and shall erect or remove the girders falsework in an expeditious manner in order that inconvenience to public traffic will be at a minimum.

The Contractor may occupy one 3-meter lane while placing or removing forms for the superstructure of bridges over Route 91, University Avenue, Mission Inn Avenue, and Third Street which are to remain open. Occupation of a traffic lane because of form work at a location will be permitted only during such times as construction operations are actually in progress and only between the hours of 9:00 a.m. and 3:00 p.m., Monday through Friday, except during hours shown on the charts included in this section "Maintaining Traffic," designated legal holidays and days preceding designated legal holidays, or when necessary for the safety of public traffic.

10-1.14 CLOSURE REQUIREMENTS AND CONDITIONS

Lane closures shall conform to the provisions in "Maintaining Traffic" of these special provisions and these special provisions.

The term closure, as used herein, is defined as the closure of a traffic lane or lanes, including ramp or connector lanes, within a single traffic control system.

CLOSURE SCHEDULE

By noon Monday, the Contractor shall submit a written schedule of planned closures for the following week period, defined as Friday noon through the following Friday noon.

The Closure Schedule shall show the locations and times when the proposed closures are to be in effect. The Contractor shall use the Closure Schedule request forms furnished by the Engineer. Closure Schedules submitted to the Engineer with incomplete, unintelligible or inaccurate information will be returned for correction and resubmittal. The Contractor will be notified of disapproved closures or closures that require coordination with other parties as a condition of approval.

Amendments to the Closure Schedule, including adding additional closures, shall be submitted to the Engineer, in writing, at least 3 working days in advance of a planned closure. Approval of amendments to the Closure Schedule will be at the discretion of the Engineer.

The Contractor shall confirm, in writing, all scheduled closures by no later than 8:00 a.m. 3 working days prior to the date on which the closure is to be made. Approval or denial of scheduled closures will be made no later than 4:00 p.m. 2 working days prior to the date on which the closure is to be made. Closures not confirmed or approved will not be allowed.

CONTINGENCY PLAN

The Contractor shall prepare a contingency plan for reopening closure to public traffic for all work requiring a closure. The plan shall identify those operations, equipment, processes and material that may fail or not operate as expected and may cause the delay of the on-time opening of the lane closure. The Contractor shall indicate what alternative or additional equipment, materials or workers will be necessary to ensure an on-time opening if one of the identified failures occurs. The alternative or additional equipment, material or workers shall be on site, be off site in the possession of the Contractor, or available through a third party. If the items are not on site, the plan shall specify the location, the method for mobilizing the items and time it will take for mobilization. The maximum amount of time to complete the mobilization of the items, located off site, shall not exceed 20 minutes.

The Contractor shall submit, within 20 days after beginning work as provided in section 8-1.03 of the Standard Specifications, or prior to any work requiring a lane closure and contingency plan for all operations, that are not done in the lane closure. The plan shall be discussed and reviewed at the pre-construction meeting. If the plan is changed, or a lane closure is required that was unanticipated when the original plan was approved, a revised plan for the affected operation shall be presented to the Engineer not less than seven days prior to the lane closure for that operation. The Contractor shall not close any lane until the contingency plan has been submitted to the Engineer and the plan has been discussed with the Engineer.

The contingency plan shall include that critical point in each operation that identifies when the contingency plan shall be activated, if there is a failure in the material, process, equipment or traffic delays exceeding 20 minutes.

LATE REOPENING OF CLOSURES

If a closure is not reopened to public traffic by the specified time, work shall be suspended in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. The Contractor shall not make any further closures until the Engineer has accepted a work plan, submitted by the Contractor, that will insure that future closures will be reopened to public traffic at the specified time. The Engineer will have 2 working days to accept or reject the Contractor's proposed work plan. The Contractor will not be entitled to any compensation for the suspension of work resulting from the late reopening of closures.

For each 15-minute interval, or fraction thereof past the time specified to reopen the closure, the Department will deduct \$1583 per interval from moneys due or that may become due the Contractor under the contract.

COMPENSATION

The Contractor shall notify the Engineer of any delay in the Contractor's operations due to the following conditions, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of those conditions, and the Contractor's loss due to that delay could not have been avoided by rescheduling the affected closure or by judicious handling of forces, equipment and plant, the delay will be considered a right of way delay within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09:

- A. The Contractor's proposed Closure Schedule is denied and his planned closures are within the time frame allowed for closures in "Maintaining Traffic" of these special provisions, except that the Contractor will not be entitled to any compensation for amendments to the Closure Schedule that are not approved.
- B. The Contractor is denied a confirmed closure.

Should the Engineer direct the Contractor to remove a closure prior to the time designated in the approved Closure Schedule, any delay to the Contractor's schedule due to removal of the closure will be considered a right of way delay within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09.

10-1.15 CONSTRUCTION ZONE ENHANCED ENFORCEMENT

Construction zone enhanced enforcement will be provided by the State as directed by the Engineer and in conformance with these special provisions. Construction zone enhanced enforcement shall consist of the presence of the California Highway Patrol (CHP) within and near the limits of construction during specified stages of work to control the movement of public traffic within the work zone. A total of 4300 hours of California Highway Patrol support is available.

The Engineer will provide additional CHP support as deemed appropriate by the Engineer.

The Contractor shall submit a schedule to the Engineer at least 15 days prior to the performance of work requiring construction zone enhanced enforcement. The schedule shall include all activities requiring construction zone enhanced enforcement and the estimated hours of CHP support required for each activity. The work shall be performed within the number of hours allocated for CHP support.

The Contractor may request additional CHP support for other times and in support of other work activities. The Contractor shall bear the costs and expenses for additional CHP support. The CHP shall be compensated at an agreed rate of \$60.00 per hour per CHP Officer. The agreed rate shall be considered full compensation for each hour, or portion thereof, that a CHP Officer is performing construction area enhanced enforcement. There will be no markup applied to any expenses connected with CHP support. The costs and expenses for requested additional CHP support will be deducted from moneys due to the Contractor.

The Engineer will make all arrangements with the CHP for scheduled and requested additional construction zone enhanced enforcement.

CHP support shall be scheduled in compliance with the provisions in "Closure Requirements and Conditions" of these special provisions. The Contractor will be notified in writing of assigned CHP support when the Contractor is informed of the approval of requested closures.

Cancellations to previously approved closures scheduled to include construction zone enhancement enforcement shall be submitted in writing to the Engineer at least 36 hours prior to the time when the closure is to be in place. Written notices of cancellation for a closure shall be delivered to the Engineer between the hours of 7:00 a.m. and 3:00 p.m., Monday through Friday, excluding designated legal holidays.

The full width of the traveled way shall be open for use by public traffic on Saturdays, Sundays and designated legal holidays; after 3:00 p.m. on Fridays and the day preceding designated legal holidays; and when construction operations are not actively in progress.

Cancellations with less than the 36-hour written notice may result in charges from the CHP. The Contractor shall bear any costs and expenses resulting from cancellations with less than the 36 hour written notice, except cancellations due to weather or circumstances beyond the control of the Contractor, as determined by the Engineer. The CHP shall be compensated not less than \$50.00 per hour and no greater than 4 hours of overtime pay per CHP Officer scheduled to participate in the construction zone enhancement enforcement that is cancelled. The costs and expenses incurred for late cancellations will be deducted from moneys due or that may become due the Contractor.

The presence of the California Highway Patrol will not relieve the Contractor of responsibility of providing for the safety of the public in conformance with the requirements in Section 7-1.09, "Public Safety," nor relieve the Contractor from the responsibility for damage in conformance with the requirements in Section 7-1.12, "Responsibility for Damage," of the Standard Specifications.

10-1.16 TRAFFIC CONTROL SYSTEM FOR LANE AND RAMP CLOSURE

A traffic control system shall consist of closing traffic lanes and ramps in conformance with the details shown on the plans, the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications, the provisions under "Maintaining Traffic" and "Construction Area Signs" of these special provisions, and these special provisions.

The provisions in this section will not relieve the Contractor from the responsibility to provide additional devices or take measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

During traffic stripe operations and pavement marker placement operations using bituminous adhesive, traffic shall be controlled, at the option of the Contractor, with either stationary or moving lane closures. During other operations, traffic shall be controlled with stationary lane closures. Attention is directed to the provisions in Section 84-1.04, "Protection From Damage," and Section 85-1.06, "Placement," of the Standard Specifications.

If components in the traffic control system are displaced or cease to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the components to the original condition or replace the components and shall restore the components to the original location.

STATIONARY LANE CLOSURE

When lane and ramp closures are made for work periods only, at the end of each work period, all components of the traffic control system, except portable delineators placed along open trenches or excavation adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations designated by the Engineer within the limits of the highway right of way.

Each vehicle used to place, maintain and remove components of a traffic control system on multilane highways shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining or removing the components. Vehicles equipped with Type II flashing arrow sign not involved in placing, maintaining or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion. The flashing arrow sign shown on the plans shall not be used on the vehicle which are doing the placing, maintaining and removing of components of a traffic control system and shall be in place before a lane closure requiring the sign's use is complete.

On 2-lane, 2-way roadways, one-way traffic shall be controlled through the project in conformance with the plan entitled "Traffic Control System for Lane Closure on Two Lane Conventional Highways" and these special provisions.

On 2-lane, 2-way roadways, when traffic is under one-way control on unpaved areas, the cones shown along the centerline on the plan need not be placed.

On 2-lane, 2-way roadways, utilizing a pilot car will be at the option of the Contractor. If the Contractor elects to use a pilot car, the cones shown along the centerline on the plan need not be placed. The pilot car shall have radio contact with personnel in the work area. The maximum speed of the pilot car through the traffic control zone shall be 40 kilometers per hour (25 mph).

MOVING LANE CLOSURE

Flashing arrow signs used in moving lane closures shall be truck-mounted. Flashing arrow signs shall be in the caution display mode when used on 2-lane highways. Changeable message signs used in moving lane closure operations shall conform to the provisions in Section 12-3.12, "Portable Changeable Message Signs," of the Standard Specifications, except the signs shall be truck-mounted. The full operation height of the bottom of the sign may be less than 2.1 m above the ground, but should be as high as practicable.

Truck-mounted attenuators (TMA) for use in moving lane closures shall be any of the following approved models, or equal:

- A. Hexfoam TMA Series 3000, Alpha 1000 TMA Series 1000 and Alpha 2001 TMA Series 2001, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076, Telephone (312) 467-6750.
 - 1. Distributor (Northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone 1-800-884-8274, FAX (916) 387-9734.
 - 2. Distributor (Southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, Telephone 1-800-222-8274.
- B. Cal T-001 Model 2 or Model 3, manufacturer and distributor; Hexcel Corporation, 11711 Dublin Boulevard, P.O. Box 2312, Dublin, CA 94568, Telephone (510) 828-4200.
- C. Renco Rengard Model Nos. CAM 8-815 and RAM 8-815, manufacturer and distributor, Renco Inc., 1582 Pflugerville Loop Road, P.O. Box 730, Pflugerville, TX 78660-0730, Telephone 1-800-654-8182.

Each TMA shall be individually identified with the manufacturer's name, address, TMA model number, and a specific serial number. The names and numbers shall each be a minimum 13 mm high and located on the left (street) side at the lower front corner. The TMA shall have a message next to the name and model number in 13 mm high letters which states, "The bottom of this TMA shall be _____ mm \pm _____ mm above the ground at all points for proper impact performance." A TMA which is damaged or appears to be in poor condition shall not be used unless recertified by the manufacturer. The Engineer shall be the sole judge whether used TMAs supplied under this contract need recertification. Each unit shall be certified by the manufacturer to meet the requirements for TMAs in conformance with the standards established by the Transportation Laboratory.

Approvals for new TMA designs proposed as equal to the above approved models shall be in conformance with the procedures (including crash testing) established by the Transportation Laboratory. For information regarding submittal of new designs for evaluation contact: Transportation Laboratory, 5900 Folsom Boulevard, Sacramento, CA 95819.

New TMAs proposed as equal to approved TMAs or approved TMAs determined by the Engineer to need recertification shall not be used until approved or recertified by the Transportation Laboratory.

PAYMENT

The contract lump sum price paid for traffic control system shall include full compensation for furnishing all labor (except for flagging costs), materials (including signs), tools, equipment, and incidentals, and for doing all the work involved in placing, removing, storing, maintaining, moving to new locations, replacing, and disposing of the components of the traffic control system and for furnishing and operating the pilot car, (including driver, radios, other equipment, and labor required), as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer. Flagging costs will be paid for as provided in Section 12-2.02, "Flagging Costs," of the Standard Specifications.

The adjustment provisions in Section 4-1.03, "Changes," of the Standard Specifications shall not apply to the item of traffic control system. Adjustments in compensation for traffic control system will be made only for increased or decreased traffic control system required by changes ordered by the Engineer and will be made on the basis of the cost of the increased or decreased traffic control necessary. The adjustment will be made on a force account basis as provided in Section 9-1.03, "Force Account Payment," of the Standard Specifications for increased work, and estimated on the same basis in the case of decreased work.

Traffic control system required by work which is classed as extra work, as provided in Section 4-1.03D of the Standard Specifications, will be paid for as a part of the extra work.

10-1.17 TEMPORARY PAVEMENT DELINEATION

Temporary pavement delineation shall be furnished, placed, maintained, and removed in conformance with the provisions in Section 12-3.01, "General," of the Standard Specifications and these special provisions. Nothing in these special provisions shall be construed as reducing the minimum standards specified in the Manual of Traffic Controls published by the Department or as relieving the Contractor from the responsibilities specified in Section 7-1.09, "Public Safety," of the Standard Specifications.

GENERAL

Whenever the work causes obliteration of pavement delineation, temporary or permanent pavement delineation shall be in place prior to opening the traveled way to public traffic. Laneline or centerline pavement delineation shall be provided at all times for traveled ways open to public traffic. On multilane roadways (freeways and expressways) edgeline delineation shall be provided at all times for traveled ways open to public traffic.

The Contractor shall perform the work necessary to establish the alignment of temporary pavement delineation, including required lines or marks. Surfaces to receive temporary pavement delineation shall be dry and free of dirt and loose material. Temporary pavement delineation shall not be applied over existing pavement delineation or other temporary pavement delineation. Temporary pavement delineation shall be maintained until superseded or replaced with a new pattern of temporary pavement delineation or permanent pavement delineation.

Temporary pavement markers, including underlying adhesive, and removable traffic tape which are applied to the final layer of surfacing or existing pavement to remain in place or which conflicts with a subsequent or new traffic pattern for the area shall be removed when no longer required for the direction of public traffic, as determined by the Engineer.

TEMPORARY LANELINE AND CENTERLINE DELINEATION

Whenever lanelines or centerlines are obliterated and temporary pavement delineation to replace the lines is not shown on the plans, the minimum laneline and centerline delineation to be provided for that area shall be temporary pavement markers placed at longitudinal intervals of not more than 7.3 m. The temporary pavement markers shall be the same color as the laneline or centerline the pavement markers replace. Temporary pavement markers shall be, at the option of the Contractor, one of the temporary pavement markers listed for short term day/night use (14 days or less) or long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. The temporary pavement markers shall be placed in conformance with the manufacturer's instructions. Temporary pavement markers for long term day/night use (6 months or less) shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used to place the temporary pavement markers in areas where removal of the temporary pavement markers will be required.

Temporary laneline or centerline delineation consisting entirely of temporary pavement markers listed for short term day/night use (14 days or less), shall be placed on longitudinal intervals of not more than 7.3 m and shall be used for a maximum of 14 days on lanes opened to public traffic. Prior to the end of the 14 days the permanent pavement delineation shall be placed. If the permanent pavement delineation is not placed within the 14 days, the Contractor shall replace the temporary pavement markers and provide additional temporary pavement delineation and shall bear the cost thereof. The additional temporary pavement delineation to be provided shall be equivalent to the pattern specified for the permanent pavement delineation for the area, as determined by the Engineer.

TEMPORARY EDGE LINE DELINEATION

On multilane roadways (freeways and expressways), whenever edgelines are obliterated and temporary pavement delineation to replace those edgelines is not shown on the plans, the edgeline delineation to be provided for those areas adjacent to lanes open to public traffic shall be as follows:

- A. Temporary pavement delineation for right edgelines shall, at the option of the Contractor, consist of either a solid 100-mm wide traffic stripe of the same color as the stripe the temporary edgeline delineation replaces, or traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 30 m.
- B. Temporary pavement delineation for left edgelines shall, at the option of the Contractor, consist of either solid 100-mm wide traffic stripe of the same color as the stripe the temporary edgeline delineation replaces, traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 30 m or temporary pavement markers placed at longitudinal intervals of not more than 1.8 m. Temporary pavement markers used for temporary left edgeline delineation shall be one of the types of temporary pavement markers listed for short term day/night use (14 days or less) or long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Traffic stripe (100-mm wide) placed as temporary edgeline delineation which will require removal shall conform to the provisions of "Temporary Traffic Stripe (Tape)" of these special provisions. Where removal of the 100-mm wide traffic stripe will not be required, painted traffic stripe conforming to the provisions of "Temporary Traffic Stripe (Paint)" of these special provisions may be used. The quantity of temporary traffic stripe (paint) used for this temporary edgeline delineation will not be included in the quantities of tape or paint to be paid for.

The lateral offset for traffic cones, portable delineators or channelizers used for temporary edgeline delineation shall be as determined by the Engineer. If traffic cones or portable delineators are used as temporary pavement delineation for edgelines, the Contractor shall provide personnel to remain at the project site to maintain the cones or delineators during the hours of the day that the portable delineators are in use.

Channelizers used for temporary edgeline delineation shall be the surface mounted type and shall be orange in color. Channelizer bases shall be cemented to the pavement in the same manner provided for cementing pavement markers to pavement in "Pavement Markers" of these special provisions, except epoxy adhesive shall not be used to place channelizers on the top layer of pavement. Channelizers shall be, at the Contractor's option, one of the surface mount types (900 mm) listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Temporary edgeline delineation shall be removed when no longer required for the direction of public traffic as determined by the Engineer.

The quantity of channelizers used as temporary edgeline delineation will not be included in the quantity of channelizers to be paid for. Full compensation for furnishing, placing, maintaining and removing temporary edgeline delineation for those areas where temporary edgeline delineation is not shown on the plans shall be considered as included in the contract prices paid for the items of work that obliterated the edgeline pavement delineation and no separate payment will be made therefor.

TEMPORARY TRAFFIC STRIPE (TAPE)

Temporary traffic stripe consisting of removable traffic stripe tape shall be applied at the locations shown on the plans. The temporary traffic stripe tape shall be complete in place at the location shown prior to opening the traveled way to public traffic.

Removable traffic stripe tape shall be the temporary removable traffic stripe tape listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Removable traffic stripe tape shall be applied in conformance with the manufacturer's installation instructions and shall be rolled slowly with a rubber tired vehicle or roller to ensure complete contact with the pavement surface. Traffic stripe tape shall be applied straight on tangent alignment and on a true arc on curved alignment. Traffic stripe tape shall not be applied when the air or pavement temperature is less than 10°C, unless the installation procedures to be used are approved by the Engineer, prior to beginning installation of the tape.

When removable traffic stripe tape is specified for temporary left edgeline delineation, temporary pavement markers placed at longitudinal intervals of not more than 1.8 m may be used in place of the temporary traffic stripe tape. Temporary pavement markers shall be one of the types of temporary pavement markers listed for long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. When temporary pavement markers are used in place of tape, payment for those temporary pavement markers will be made on the basis of the theoretical length of the temporary traffic stripe (tape) required for the left edgeline which the temporary pavement markers replace.

TEMPORARY PAVEMENT MARKING (TAPE)

Temporary pavement marking consisting of removable pavement marking tape shall be applied at the locations shown on the plans. The temporary pavement marking tape shall be complete in place at the location shown, prior to opening the traveled way to public traffic.

Removable pavement marking tape shall be the temporary removable type pavement marking tape listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions and shall be applied and removed in conformance with the provisions specified for applying and removing the temporary traffic stripe tape.

TEMPORARY PAVEMENT MARKERS

Temporary pavement markers shall be applied at the locations shown on the plans. The pavement markers shall be applied complete in place at the locations shown prior to opening the traveled way to public traffic.

Temporary pavement markers shown on the plans shall be, at the option of the Contractor, one of the temporary pavement markers for long term day/night use (6 months or less) listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Temporary pavement markers shall be placed in conformance with the manufacturer's instructions and shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used in areas where removal of the pavement markers will be required.

Where the temporary pavement delineation shown on the plans for lanelines or centerlines consists entirely of a pattern of broken traffic stripe and pavement markers, the Contractor may use groups of the temporary pavement markers for long term day/night use (6 months or less) in place of the temporary traffic stripe tape or painted temporary traffic stripe. The groups of pavement markers shall be spaced as shown on the plans for a similar pattern of permanent traffic line, except pavement markers shown to be placed in the gap between the broken traffic stripe shall be placed as part of the group to delineate the pattern of broken temporary traffic stripe. The kind of laneline and centerline delineation selected by the Contractor shall be continuous within a given location. Payment for those temporary pavement markers used in place of temporary traffic stripe will be made on the basis of the theoretical length of the patterns of temporary traffic stripe (tape) or temporary traffic stripe (paint).

Retroreflective pavement markers conforming to the provisions in "Pavement Markers" of these special provisions may be used in place of temporary pavement markers for long term day/night use (6 months or less) except to simulate patterns of broken traffic stripe. Placement of the retroreflective pavement markers used for temporary pavement markers shall conform to the provisions in "Pavement Markers" of these special provisions except the waiting period provisions before placing the pavement markers on new asphalt concrete surfacing as specified in Section 85-1.06, "Placement," of the Standard Specifications shall not apply and epoxy adhesive shall not be used to place pavement markers in areas where removal of the pavement markers will be required.

MEASUREMENT AND PAYMENT

Temporary traffic stripe (tape) will be measured and paid for by the meter, measured along the line of the stripe, with deductions for gaps in broken traffic stripes. Double and 200-mm temporary traffic stripes, shown on the plans as tape, will be measured as 2 temporary traffic stripes (tape). Temporary pavement marking (tape) will be measured and paid for by the square meter for actual area of the pavement marking that receives tape.

The contract price paid per meter for temporary traffic stripe (tape) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying, maintaining and removing temporary traffic stripe tape, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per square meter for temporary pavement marking (tape) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying, maintaining and removing temporary pavement marking tape, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.18 PORTABLE FLASHING BEACON

Portable flashing beacons conforming to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications shall be furnished, placed and maintained at the locations shown on the plans or where designated by the Engineer.

If flashing beacons are displaced or are not in an upright position from any cause, during the progress of the work, the Contractor shall immediately repair and repaint or replace the flashing beacons in their original locations.

At the end of each night's work, portable flashing beacon units shall be removed from the traveled way. If the Contractor so elects, the flashing beacon units may be stored at selected central locations designated by the Engineer within the limits of the highway right of way. Full compensation for placing, removing and storing flashing beacon units daily as the work progresses shall be considered as included in the contract unit price paid for flashing beacon (portable) and no additional compensation will be allowed therefor.

The quantity of flashing beacon (portable) to be paid for will be measured by the unit as determined from actual count in place at the locations shown on the plans or at other locations designated by the Engineer. Each flashing beacon will be counted once at each location shown on the plans or at other locations determined by the Engineer. Repaired or replacement portable flashing beacons placed at the locations will not be considered as additional units for payment purposes. Portable flashing beacons shown on the plans as part of a traffic control system shall be considered as part of that traffic control system and will be paid for in conformance with the provisions in "Traffic Control System for Lane Closures" of these special provisions.

The contract unit price paid for flashing beacon (portable) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing, placing, operating, maintaining, repairing, replacing, and removing portable flashing beacons, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.19 BARRICADE

Barricades shall be furnished, placed and maintained at the locations shown on the plans, specified in the Standard Specifications or in these special provisions or where designated by the Engineer. Barricades shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to "Prequalified and Tested Signing and Delineation Materials" of these special provisions regarding retroreflective sheeting for barricades.

Construction area sign and marker panels conforming to the provisions in Section 12-3.06, "Construction Area Signs," of the Standard Specifications shall be installed on barricades in a manner determined by the Engineer at the locations shown on the plans.

Sign panels for construction area signs and marker panels installed on barricades shall conform to the provisions in Section 12-3.06A, "Stationary Mounted Signs," of the Standard Specifications.

Full compensation for furnishing, installing, maintaining, and removing construction area signs and marker panels on barricades shall be considered as included in the contract unit price paid for the type of barricade involved and no separate payment will be made therefor.

10-1.20 PORTABLE CHANGEABLE MESSAGE SIGN

Portable changeable message signs shall be furnished, placed, operated, and maintained at those locations shown on the plans or where designated by the Engineer in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

10-1.21 FLASHING ARROW SIGNS

Flashing arrow signs shall be furnished, placed, operated, and maintained at those locations shown on the plans or where designated by the Engineer in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to "Maintaining Traffic" of these special provisions regarding the use of the flashing arrow signs. Flashing arrow signs will be measured by the unit from actual count. The contract unit price paid for flashing arrow signs shall include full compensation for furnishing all labor, materials, tool, equipment, and incidentals, and for doing all the work involved in furnishing, placing, operating, maintaining, repairing, replacing, transporting from location to location, and removing the flashing arrow signs, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.22 TEMPORARY RAILING

Temporary railing (Type K) shall be placed as shown on the plans, as specified in the Standard Specifications or these special provisions or where ordered by the Engineer and shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Reflectors on temporary railing (Type K) shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Temporary railing (Type K), conforming to the details shown on Standard Plan T3 may be used. Temporary railing (Type K) fabricated prior to January 1, 1993, and conforming to 1988 Standard Plan B11-30 may be used, provided the fabrication date is printed on the required Certificate of Compliance and vertical holes are not drilled in the top of the temporary railing to secure temporary traffic screen to the temporary railing.

Attention is directed to "Public Safety" and "Order of Work" of these special provisions.

Temporary railing (Type K) placed in conformance with the provisions in "Public Safety" of these special provisions will be neither measured nor paid for.

10-1.23 CHANNELIZER

Channelizers shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Channelizers shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

When no longer required for the work as determined by the Engineer, channelizers and underlying adhesive used to cement the channelizer bases to the pavement shall be removed. Removed channelizers and adhesive shall become the property of the Contractor and shall be removed from the site of work.

10-1.24 TEMPORARY TRAFFIC SCREEN

Temporary traffic screen shall be furnished, installed, and maintained on top of temporary railing (Type K) at the locations designated on the plans, specified in the special provisions or directed by the Engineer and shall conform to the provisions specified for traffic handling equipment and devices in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Temporary traffic screen panels shall be new or used CDX Grade, or better, plywood or weather resistant strandboard mounted and anchored on temporary railing (Type K). Wale boards shall be new or used Douglas fir, rough sawn, Construction Grade, or better. Pipe screen supports shall be new or used galvanized steel pipe, Schedule 40. Nuts, bolts, and washers shall be cadmium plated. Screws shall be black or cadmium plated flat head, cross slotted screws with full thread length.

When no longer required, as determined by the Engineer, temporary traffic screen shall be removed from the site of the work and shall become the property of the Contractor.

Temporary traffic screen will be measured by the meter from actual measurements along the line of the completed temporary traffic screen, at each location designated on the plans, specified or directed by the Engineer. If the Engineer orders a lateral move of temporary railing, with temporary traffic screen attached, and the repositioning is not shown on the plans, moving the temporary traffic screen will be paid for as part of the extra work for moving the temporary railing as specified in Section 12-4.01, "Measurement and Payment," of the Standard Specifications. Temporary traffic screen placed in excess of the length shown, specified or directed by the Engineer will not be paid for.

The contract price paid per meter for temporary traffic screen shall include full compensation for furnishing all labor, materials (including anchoring systems), tools, equipment, and incidentals, and for doing all the work involved in installing, maintaining, and removing the temporary traffic screen, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.25 TEMPORARY CRASH CUSHION MODULE

This work shall consist of furnishing, installing, and maintaining sand filled temporary crash cushion modules in groupings or arrays at each location shown on the plans, as specified in these special provisions or where designated by the Engineer. The grouping or array of sand filled modules shall form a complete sand filled temporary crash cushion in conformance with the details shown on the plans and these special provisions.

Attention is directed to "Public Safety", "Order of Work", and "Temporary Railing" of these special provisions.

Whenever the work or the Contractor's operations establishes a fixed obstacle, the exposed fixed obstacle shall be protected with a sand filled temporary crash cushion. The sand filled temporary crash cushion shall be in place prior to opening the lanes adjacent to the fixed obstacle to public traffic.

Sand filled temporary crash cushions shall be maintained in place at each location, including times when work is not actively in progress. Sand filled temporary crash cushions may be removed during a work period for access to the work provided that the exposed fixed obstacle is 4.6 m or more from a lane carrying public traffic and the temporary crash cushion is reset to protect the obstacle prior to the end of the work period in which the fixed obstacle was exposed. When no longer required, as determined by the Engineer, sand filled temporary crash cushions shall be removed from the site of the work.

At the Contractor's option, the modules for use in sand filled temporary crash cushions shall be either Energite III Inertial Modules, Fitch Inertial Modules or Traffix Sand Barrels manufactured after March 31, 1997, or equal:

- A. Energite III and Fitch Inertial Modules, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076. Telephone 1-312-467-6750, FAX 1-800-770-6755
 - 1. Distributor (North): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828. Telephone 1-800-884-8274, FAX 1-916-387-9734
 - 2. Distributor (South): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805. Telephone 1-800-222-8274, FAX 1-714-937-1070

- B. TraFFix Sand Barrels, manufactured by TraFFix Devices, Inc., 220 Calle Pintesco, San Clemente, CA 92672. Telephone 1-949 361-5663, FAX 1-949 361-9205
1. Distributor (North): United Rentals, Inc., 1533 Berger Drive, San Jose, CA 95112. Telephone 1-408 287-4303, FAX 1-408 287-1929
 2. Distributor (South): Statewide Safety & Sign, Inc., P.O. Box 1440, Pismo Beach, CA 93448. Telephone 1-800-559-7080, FAX 1-805 929-5786

Modules contained in each temporary crash cushion shall be of the same type at each location. The color of the modules shall be the standard yellow color, as furnished by the vendor, with black lids. The modules shall exhibit good workmanship free from structural flaws and objectionable surface defects. The modules need not be new. Good used undamaged modules conforming to color and quality of the types specified herein may be utilized. If used Fitch modules requiring a seal are furnished, the top edge of the seal shall be securely fastened to the wall of the module by a continuous strip of heavy duty tape.

Modules shall be filled with sand in conformance with the manufacturer's directions, and to the sand capacity in kilograms for each module shown on the plans. Sand for filling the modules shall be clean washed concrete sand of commercial quality. At the time of placing in the modules, the sand shall contain not more than 7 percent water as determined by California Test 226.

Modules damaged due to the Contractor's operations shall be repaired immediately by the Contractor at the Contractor's expense. Modules damaged beyond repair, as determined by the Engineer, due to the Contractor's operations shall be removed and replaced by the Contractor at the Contractor's expense.

Temporary crash cushion modules shall be placed on movable pallets or frames conforming to the dimensions shown on the plans. The pallets or frames shall provide a full bearing base beneath the modules. The modules and supporting pallets or frames shall not be moved by sliding or skidding along the pavement or bridge deck.

A Type R or P marker panel shall be attached to the front of the crash cushion as shown on the plans, when the closest point of the crash cushion array is within 3.6 m of the traveled way. The marker panel, when required, shall be firmly fastened to the crash cushion with commercial quality hardware or by other methods determined by the Engineer.

At the completion of the project, temporary crash cushion modules, sand filling, pallets or frames, and marker panels shall become the property of the Contractor and shall be removed from the site of the work. Temporary crash cushion modules shall not be installed in the permanent work.

Temporary crash cushion modules will be measured by the unit as determined from the actual count of modules used in the work or ordered by the Engineer at each location. Temporary crash cushion modules placed in conformance with the provisions in "Public Safety" of these special provisions and modules placed in excess of the number specified or shown will not be measured nor paid for.

Repairing modules damaged by public traffic will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. Modules damaged beyond repair by public traffic, when ordered by the Engineer, shall be removed and replaced immediately by the Contractor. Modules replaced due to damage by public traffic will be measured and paid for as temporary crash cushion module.

If the Engineer orders a lateral move of the sand filled temporary crash cushions and the repositioning is not shown on the plans, moving the sand filled temporary crash cushion will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications and these temporary crash cushion modules will not be counted for payment in the new position.

The contract unit price paid for temporary crash cushion module shall include full compensation for furnishing all labor, materials (including sand, pallets or frames and marker panels), tools, equipment, and incidentals, and for doing all the work involved in furnishing, installing, maintaining, moving, and resetting during a work period for access to the work, and removing from the site of the work when no longer required (including those damaged by public traffic) sand filled temporary crash cushion modules, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.26 EXISTING HIGHWAY FACILITIES

The work performed in connection with various existing highway facilities shall conform to the provisions in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Plans of the existing bridges may be requested by fax from the Office of Structure Maintenance and Investigations, 1801 30th Street, Sacramento, CA, Fax (916) 227-8357, and are available at the Office of Structure Maintenance and Investigations, Los Angeles, CA, Telephone (213) 897-6156.

Plans of the existing bridges available to the Contractor are reproductions of the original contract plans with significant changes noted and working drawings and do not necessarily show normal construction tolerances and variances. Where dimensions of new construction required by this contract are dependent on the dimensions of the existing bridges, the Contractor shall verify the controlling field dimensions and shall be responsible for adjusting dimensions of the work to fit existing conditions.

SALVAGE METAL BEAM GUARD RAILING

Existing metal beam guard railing, where shown on the plans to be salvaged, shall be removed and salvaged.

Salvaged metal beam guard railing materials shall be hauled to the Fontana Rest Area. The Contractor should call (909) 877-9020 before delivery and stockpiled.

Existing concrete anchors or steel foundation tubes shall be completely removed and disposed of. Full compensation for removing and disposing of concrete anchors or steel foundation tubes shall be considered as included in the contract price paid per meter for salvage metal beam guard railing and no separate payment will be made therefor.

Full compensation for removing cable anchor assemblies, terminal anchor assemblies or steel foundation tubes shall be considered as included in the contract price paid per meter for salvage metal beam guard railing and no separate payment will be made therefor.

SALVAGE DOUBLE METAL BEAM BARRIER

double metal beam barrier, where shown on the plans to be salvaged, shall be removed and salvaged.

Salvaged double metal beam barrier material shall be bundled, tagged and hauled to a location specified by the District Regional Coordinator and stockpiled.

Existing concrete anchors shall be completely removed and disposed of. Full compensation for removing and disposing of concrete anchors shall be considered as included in the contract price paid per meter for salvage metal beam barrier and no separate payment will be made therefor.

Full compensation for removing cable anchor assemblies, shall be considered as included in the contract price paid per meter for salvage metal beam barrier and no separate payment will be made therefor.

REMOVE METAL BEAM GUARD RAILING

Existing metal beam guard railing, where shown on the plans to be removed, shall be removed and disposed of.

Existing concrete anchors or steel foundation tubes shall be completely removed and disposed of. Full compensation for removing concrete anchors shall be considered as included in the contract price paid per meter for remove metal beam guard railing and no separate payment will be made therefor.

Full compensation for removing cable anchor assemblies, terminal anchor assemblies or steel foundation tubes shall be considered as included in the contract price paid per meter for remove metal beam guard railing and no separate payment will be made therefor.

REMOVE SIGN STRUCTURE

Existing sign structures, where shown on the plans to be removed, shall be removed and disposed of.

Overhead sign structure removal shall consist of removing posts, frames, portions of foundations, sign panels, walkways with safety railings, and sign lighting electrical equipment.

Bridge mounted sign structure removal shall consist of removing sign panels and frames, sign lighting electrical equipment, walkways with safety railings, structural braces and supports, and hardware.

A sign structure shall not be removed until the structure is no longer required for the direction of public traffic.

Concrete foundations may be abandoned in place, except that the top portion, including anchor bolts, reinforcing steel, and conduits shall be removed to a depth of not less than 1 m below the adjacent finished grade. The resulting holes shall be backfilled and compacted with material equivalent to the surrounding material.

Electrical wiring shall be removed to the nearest pull box. Fuses within spliced connections in the pull box shall be removed and disposed of.

Electrical equipment, where shown on the plans, shall be salvaged.

Existing pavement markers, including underlying adhesive, when no longer required for traffic lane delineation as determined by the Engineer, shall be removed and disposed of.

REMOVE TRAFFIC STRIPE AND PAVEMENT MARKING

Traffic stripe and pavement marking shall be removed at the locations shown on the plans and as directed by the Engineer.

Attention is directed to "Water Pollution Control" of these special provisions.

Waste from removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking contains lead chromate in average concentrations greater than or equal to 5 mg/L Soluble Lead or 1000 mg/kg Total Lead. Yellow thermoplastic and yellow painted traffic stripe as shown on the plans. Residue produced from when yellow thermoplastic and yellow paint are removed may contain heavy metals in concentrations that exceed thresholds established by the California Health and Safety Code and may produce toxic fumes when heated.

The removed yellow thermoplastic and yellow paint shall be disposed of at a Class 1 disposal facility in conformance with the requirements of the disposal facility operator within 15 days after accumulating 100 kg of residue and dust. The Contractor shall make necessary arrangements with the operator of the disposal facility to test the yellow thermoplastic and yellow paint residue as required by the facility and these special provisions. Testing shall include, at a minimum, (1) Total Lead and Chromium by EPA Method 7000 series and (2) Soluble Lead and Chromium by California Waste Extraction Test. From the first 3360 L of waste or portion thereof, if less than 3360 L of waste are produced, a minimum of four randomly selected samples shall be taken and analyzed. From each additional 840 L of waste or portion thereof, if less than 840 L are produced, a minimum of one additional random sample shall be taken and analyzed. The Contractor shall submit the name and location of the disposal facility and analytical laboratory along with the testing requirements to the Engineer not less than 15 days prior to the start of removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking. The analytical laboratory shall be certified by the Department of Health Services Environmental Laboratory Accreditation Program. Test results shall be provided to the Engineer for review prior to signing a waste profile as requested by the disposal facility, prior to issuing an EPA identification number, and prior to allowing removal of the waste from the site.

The Contractor shall prepare a project specific Lead Compliance Plan to prevent or minimize worker exposure to lead while handling removed yellow thermoplastic and yellow paint residue. Attention is directed to Title 8, California Code of Regulations, Section 1532.1, "Lead," for specific Cal-OSHA requirements when working with lead.

The Lead Compliance Plan shall contain the elements listed in Title 8, California Code of Regulations, Section 1532.1(e)(2)(B). Before submission to the Engineer, the Lead Compliance Plan shall be approved by an Industrial Hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene. The Plan shall be submitted to the Engineer at least 7 days prior to beginning removal of yellow thermoplastic and yellow paint.

Prior to removing yellow thermoplastic and yellow painted traffic stripe and pavement marking, personnel who have no prior training, including State personnel, shall complete a safety training program provided by the Contractor that meets the requirements of Title 8, California Code of Regulations, Section 1532.1, "Lead," and the Contractor's Lead Compliance Program.

Personal protective equipment, training, and washing facilities required by the Contractor's Lead Compliance Plan shall be supplied to State personnel by the Contractor. The number of State personnel will be 3.

Where grinding or other methods approved by the Engineer are used to remove yellow thermoplastic and yellow painted traffic stripe and pavement marking, the removed residue, including dust, shall be contained and collected immediately. Sweeping equipment shall not be used. Collection shall be by a high efficiency particulate air (HEPA) filter equipped vacuum attachment operated concurrently with the removal operations or other equally effective methods approved by the Engineer. The Contractor shall submit a written work plan for the removal, storage, and disposal of yellow thermoplastic and yellow painted traffic stripe and pavement marking to the Engineer for approval not less than 7 days prior to the start of the removal operations. Removal operations shall not be started until the Engineer has approved the work plan.

The removed yellow thermoplastic and yellow painted traffic stripe and pavement marking residue shall be stored and labeled in covered containers. Labels shall conform to the provisions of Title 22, California Code of Regulations, Sections 66262.31 and 66262.32. Labels shall be marked with date when the waste is generated, the words "Hazardous Waste", composition and physical state of the waste (for example, asphalt grindings with thermoplastic or paint), the word "Toxic", the name and address of the Engineer, the Engineer's telephone number, contract number, and Contractor or subcontractor. The containers shall be a type approved by the United States Department of Transportation for the transportation and temporary storage of the removed residue. The containers shall be handled so that no spillage will occur. The containers shall be stored in a secured enclosure at a location within the project limits until disposal, as approved by the Engineer.

If the yellow thermoplastic and yellow painted traffic stripe and pavement marking residue is transported to a Class 1 disposal facility, a manifest shall be used, and the transporter shall be registered with the California Department of Toxic Substance Control. The Engineer will obtain the United States Environmental Protection Agency Identification Number and sign all manifests as the generator within 2 working days of receiving sample test results and approving the test methods.

The Contractor shall assume that the yellow paint removed is not regulated under the Federal Resource Conservation and Recovery Act (RCRA). Additional disposal costs for removal residue regulated under RCRA, as determined by test results required by the disposal facility, will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Nothing in these special provisions shall relieve the Contractor of the Contractor's responsibilities as specified in Section 7-1.09, "Public Safety," of the Standard Specifications.

Attention is directed to "Material Containing Aerially Deposited Lead" of these special provisions regarding payment for the Lead Compliance Plan.

Full compensation for providing a written work plan for the removal, storage, and disposal of yellow thermoplastic and yellow painted traffic stripe and pavement marking shall be considered as included in the contract items paid per meter for remove yellow painted traffic stripe or per square meter for remove yellow thermoplastic pavement marking and no separate payment will be made therefor.

REMOVE HEADWALL

Existing headwalls, as shown on the plans to be removed, shall be completely removed and disposed of.

The contract unit price paid per removal of headwall shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in removing headwalls as shown on the plans, and as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

REMOVE DRAINAGE INLET

Existing drainage inlets, where shown on the plans to be removed, shall be removed and disposed of.

The contract unit price paid per removal of drainage inlet shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in removing drainage inlet shown on the plans, and as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

REMOVE CULVERT

Existing culverts as shown on the plans to be removed, shall be completely removed and disposed of.

The contract unit price paid per meter of culvert removal shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in removing culvert as shown on the plans, and as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

REMOVE JUNCTION BOX

Existing junction box, as shown on the plans to be removed, shall be completely removed and disposed of.

The contract unit price paid per removal of junction box shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in removing headwalls as shown on the plans, and as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

MODIFY DRAINAGE INLET

Existing drainage inlets, shall be modified as shown on the plans, and as directed by the engineer.

The contract unit price paid per modify drainage inlet, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in completing the operations as shown on the plans, and as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

REMOVE ASPHALT CONCRETE DIKE

Existing asphalt concrete dike, where shown on the plans to be removed, shall be removed.

Prior to removing the dike, the outside edge of the asphalt concrete to remain in place shall be cut on a neat line to a minimum depth of 50 mm.

The dike shall be removed in such a manner that the surfacing which is to remain in place is not damaged.

The dike shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

REMOVE ROADSIDE SIGN

Existing roadside signs, at those locations shown on the plans to be removed, shall be removed and disposed of.

Existing roadside signs shall not be removed until replacement signs have been installed or until the existing signs are no longer required for the direction of public traffic, unless otherwise directed by the Engineer.

REMOVE DELINEATOR

Existing delineators, at those locations shown on the plans to be removed, shall be removed and disposed of.

RECONSTRUCT CHAIN LINK FENCE

Existing chain link fence, at the locations shown on the plans, shall be removed and reconstructed.

Fence removed in excess of that required for reconstructing chain link fence shall be disposed of. compensation for removing and disposing of excess fence shall be considered as included in the contract price paid per meter for reconstruct chain link fence and no separate payment will be made therefor.

REMOVE CHAIN LINK FENCE

Existing chain link fence, at the locations shown on the plans, shall be removed and disposed of.

Full compensation for removing and disposing of fence shall be considered as included in the contract price paid per meter for remove chain link fence and no separate payment will be made therefor.

RESET ROADSIDE SIGN

Existing roadside signs, where shown on the plans to be reset, shall be removed and reset.

Each roadside sign shall be reset on the same day that the sign is removed.

Two holes shall be drilled in each existing post as required to provide the breakaway feature shown on the plans.

RESET OBJECT MARKER

Existing object marker, where shown on the plans to be reset, shall be removed and reset.

Each object marker shall be reset on the same day that the object marker is removed.

RELOCATE ROADSIDE SIGN

Existing roadside signs shall be removed and relocated to the new locations shown on the plans.

Each roadside sign shall be installed at the new location on the same day that the sign is removed from its original location.

Two holes shall be drilled in each existing post as required to provide the breakaway feature shown on the plans.

MODIFY MANHOLE

Existing manholes where shown in the plan to be modified, shall be modified as shown on the plans, and as directed by the Engineer.

Frames and covers of existing manholes, junction structure, pipe connections or other facilities shall be constructed or adjusted to grade in conformance with the provisions in Section 15-2.05, "Reconstruction," of the Standard Specifications.

OBLITERATE SURFACING

Existing surfacing, when no longer required for the passage of public traffic, shall be obliterated at the locations shown on the plans.

Surfacing shall not be obliterated by the earth cover method.

Obliteration shall consist of rooting, plowing, pulverizing or scarifying the existing surfacing in conformance with the provisions in Section 15-2.02A, "Obliterating Roads and Detours," of the Standard Specifications.

REMOVE BASE AND SURFACING

Existing base and bituminous surfacing shown on the plans to be removed, shall be removed to a depth of at least 150 mm below the grade of the existing surfacing. Resulting holes and depressions shall be backfilled with earthy material selected from excavation to the lines and grade established by the Engineer.

Removing base and surfacing will be measured by the cubic meter in the same manner specified for roadway excavation in conformance with the provisions in Section 19, "Earthwork," of the Standard Specifications and will be paid for at the contract price per cubic meter for remove base and surfacing.

COLD PLANE ASPHALT CONCRETE PAVEMENT

Existing asphalt concrete pavement shall be cold planed at the locations and to the dimensions shown on the plans.

Planing asphalt concrete pavement shall be performed by the cold planing method. Planing of the asphalt concrete pavement shall not be done by the heater planing method.

Cold planing machines shall be equipped with a cutter head not less than 750 mm in width and shall be operated so that no fumes or smoke will be produced. The cold planing machine shall plane the pavement without requiring the use of a heating device to soften the pavement during or prior to the planing operation.

The depth, width, and shape of the cut shall be as shown on the typical cross sections or as designated by the Engineer. The final cut shall result in a uniform surface conforming to the typical cross sections. The outside lines of the planed area shall be neat and uniform. Planing asphalt concrete pavement operations shall be performed without damage to the surfacing to remain in place.

Planed widths of pavement shall be continuous except for intersections at cross streets where the planing shall be carried around the corners and through the conform lines. Following planing operations, a drop-off of more than 45 mm will not be allowed between adjacent lanes open to public traffic.

Where transverse joints are planed in the pavement at conform lines no drop-off shall remain between the existing pavement and the planed area when the pavement is opened to public traffic. If asphalt concrete has not been placed to the level of existing pavement before the pavement is to be opened to public traffic a temporary asphalt concrete taper shall be constructed. Asphalt concrete for temporary tapers shall be placed to the level of the existing pavement and tapered on a slope of 1:30 (Vertical: Horizontal) or flatter to the level of the planed area.

Asphalt concrete for temporary tapers shall be commercial quality and may be spread and compacted by any method that will produce a smooth riding surface. Temporary asphalt concrete tapers shall be completely removed, including the removal of loose material from the underlying surface, before placing the permanent surfacing. The removed material shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Operations shall be scheduled so that not more than 7 days shall elapse between the time when transverse joints are planed in the pavement at the conform lines and the permanent surfacing is placed at the conform lines.

The material planed from the roadway surface, including material deposited in existing gutters or on the adjacent traveled way, shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. Removal operations of cold planed material shall be concurrent with planing operations and follow within 15 m of the planer, unless otherwise directed by the Engineer.

Cold plane asphalt concrete pavement will be measured by the square meter. The quantity to be paid for will be the actual area of surface cold planed irrespective of the number of passes required to obtain the depth shown on the plans.

The contract price paid per square meter for cold plane asphalt concrete pavement shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in cold planing asphalt concrete surfacing and disposing of planed material, including furnishing the asphalt concrete for and constructing, maintaining, removing, and disposing of temporary asphalt concrete tapers, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

BRIDGE REMOVAL

Removing bridges or portions of bridges shall conform to the provisions in Section 15-4, "Bridge Removal," of the Standard Specifications and these special provisions.

Spruce Street (Bridge Number 56-0800): Bridge removal shall consist of removing the existing bridge, as shown on the plans.

University Avenue (Bridge Number 56-0314): Bridge removal (portion), location A, shall consist of removing portions of the existing steel railing, concrete barrier, overhang, curb, and retaining walls.

Mission Inn Avenue (Bridge Number 56-0315): Bridge removal (portion), location B, shall consist of removing portions of the existing steel railing, concrete barrier, overhang, curb, and retaining walls.

Third Street (Bridge Number 56-0316): Bridge removal (portion), location C, shall consist of removing portions of existing overhang.

Removed materials that are not to be salvaged or used in the reconstruction shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The Contractor shall submit a complete bridge removal plan to the Engineer for each bridge listed above, detailing procedures, sequences, and all features required to perform the removal in a safe and controlled manner.

The bridge removal plan shall include, but not be limited to the following:

- A. The removal sequence, including staging of removal operations.
- B. Equipment locations on the structure during removal operations.
- C. Temporary support shoring or temporary bracing.
- D. Locations where work is to be performed over traffic, utilities, or railroad property.
- E. Details, locations, and types of protective covers to be used.
- F. Measures to assure that people, property, utilities, and improvements will not be endangered.
- G. Details and measures for preventing material, equipment, and debris from falling onto public traffic, or railroad property.

When protective covers are required for removal of portions of a bridge, or when superstructure removal works on bridges are involved, the Contractor shall submit working drawings, with design calculations, to the Engineer for the proposed bridge removal plan, and the bridge removal plan shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California. The design calculations shall be adequate to demonstrate the stability of the structure during all stages of the removal operations. Calculations shall be provided for each stage of bridge removal and shall include dead and live load values assumed in the design of protective covers. At a minimum, a stage will be considered to be removal of the deck, the soffit, or the girders, in any span; or walls, bent caps, or columns at support locations.

Temporary support shoring, temporary bracing, and protective covers, as required, shall be designed and constructed in conformance with the provisions in Section 51-1.06, "Falsework," of the Standard Specifications and these special provisions.

The assumed horizontal load to be resisted by the temporary support shoring and temporary bracing, for removal operations only, shall be the sum of the actual horizontal loads due to equipment, construction sequence or other causes, and an allowance for wind, but in no case shall the assumed horizontal load to be resisted in any direction be less than 5 percent of the total dead load of the structure to be removed.

The bridge removal plan shall conform to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The number of sets of drawings, design calculations, and unless otherwise specified in the following table, the time for reviewing bridge removal plans shall be the same as specified for falsework working drawings in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications.

The time to be provided for the Engineer's review of the bridge removal plans for removing specific structures, or portions thereof, shall be as follows:

Structure or Portion of Structure	Review Time - Weeks
Spruce Street Overcrossing	4

The following additional requirements apply to the removal of bridges or portions of bridges that are over or adjacent to roadways that may be closed to public traffic for only brief periods of time:

- A. The closure of roadways to public traffic shall conform to the provisions in "Maintaining Traffic" of these special provisions.
- B. Prior to closing a roadway to traffic to accommodate bridge removal operations, the Contractor shall have all necessary workers, materials, and equipment at the site as needed to proceed with the removal work in an expeditious manner. While the roadway is closed to public traffic, work shall be pursued promptly and without interruption until the roadway is reopened to public traffic.
- C. Bridge removal operations shall be performed during periods of time that the roadway is closed to public traffic except as specified herein for preliminary work.
- D. Preliminary work shall be limited to operations that will not reduce the structural strength or stability of the bridge, or any element thereof, to a level that in the judgment of the Engineer would constitute a hazard to the public. This preliminary work shall also be limited to operations that cannot cause debris or any other material to fall onto the roadway. Protective covers may be used to perform preliminary work such as chipping or cutting the superstructure into segments, provided the covers are of sufficient strength to support all loads and are sufficiently tight to prevent dust and fine material from sifting down onto the traveled way. Protective covers shall extend at least 1.2 m beyond the limit of the work underway. Bottom slabs of box girders may be considered to be protective covers for preliminary work performed on the top slab inside the limits of the exterior girders.
- E. Temporary support shoring and temporary bracing shall be used in conjunction with preliminary work when necessary to insure the stability of the bridge.
- F. Temporary support shoring, temporary bracing, and protective covers shall not encroach closer than 2.4 m horizontally from the edge or 4.6 m vertically above any traffic lane or shoulder that is open to public traffic.
- G. During periods when the roadway is closed to public traffic, debris from bridge removal operations may be allowed to fall directly onto the lower roadway provided adequate protection is furnished for all highway facilities. The minimum protection for paved areas shall be a 0.6-m thick earthen pad or a 25-mm thick steel plate placed over the area where debris can fall. Prior to reopening the roadway to public traffic, all debris, protective pads, and devices shall be removed and the roadway swept clean with wet power sweepers or equivalent methods.
- H. The removal operations shall be conducted in such a manner that the portion of the structure not yet removed remains in a stable condition at all times. For girder bridges, each girder shall be completely removed within a span before the removal of the adjacent girder is begun. For slab type bridges, removal operations within a span shall be performed along a front that roughly parallels the primary reinforcing steel.

The following additional requirements apply to the removal of bridges or portions of bridges whenever the removal work is to be performed over public traffic:

- A. A protective cover shall be constructed before beginning bridge removal work. The protective cover shall be supported by shoring, falsework, or members of the existing structure. The Contractor shall be responsible for designing and constructing safe and adequate protective covers, shoring, and falsework with sufficient strength and rigidity to support the entire load to be imposed.
- B. The construction and removal of the protective cover, and the installation and removal of temporary railings shall conform to the provisions in "Maintaining Traffic" of these special provisions.

- C. Bridge removal methods shall be described in the working drawings, supported by calculations with sufficient details to substantiate live loads used in the protective cover design. Dead and live load values assumed for designing the protective cover shall be shown on the working drawings.
- D. The protective cover shall prevent any materials, equipment, or debris from falling onto public traffic. The protective cover shall have a minimum strength equivalent to that provided by good, sound Douglas fir planking having a nominal thickness of 50 mm. Additional layers of material shall be furnished as necessary to prevent fine materials or debris from sifting down upon the traveled way and shoulders.
- E. During the removal of bridge segments, and when portions of the bridge, such as deck slabs or box girder slabs, comply with the requirements for the protective cover, a separate protective cover need not be constructed.
- F. At locations where only bridge railing is to be removed, the protective cover shall extend from the face of the exterior girder or at least 0.6-m inside of the bridge railing to be removed, whichever is less, to at least 1.2 m beyond the outside face of the bridge railing.
- G. At locations where entire girders are to be removed, the protective cover shall extend at least 3 m beyond the outside face of the bridge railing.
- H. The protective cover shall extend at least 3 m beyond the outside face of the bridge railing, except that, at locations where the bridge railing is to be removed and new girders are not constructed, the protective cover shall extend from the face of the exterior girder or at least 0.6-m inside of the bridge railing to be removed, whichever is less, to at least 1.2 m beyond the outside face of the bridge railing.
- I. The protective cover shall provide the openings specified under "Maintaining Traffic" of these special provisions, except that when no openings are specified for bridge removal, a vertical opening of 4.6 m and a horizontal opening of 9.8 m shall be provided for the passage of public traffic.
- J. Falsework or supports for protective covers shall not extend below the vertical clearance level nor to the ground line at any location within the roadbed.
- K. The construction of the protective cover as specified herein shall not relieve the Contractor of responsibilities specified in Section 7-1.12A, "Indemnification," and Section 7-1.12B, "Insurance," of the Standard Specifications.
- L. Before removal of the protective cover, the Contractor shall clean the protective cover of all debris and fine material.

For bridge removal that requires the Contractor's registered engineer to prepare and sign the bridge removal plan, the Contractor's registered engineer shall be present at all times when bridge removal operations are in progress. The Contractor's registered engineer shall inspect the bridge removal operation and report in writing on a daily basis the progress of the operation and the status of the remaining structure. A copy of the daily report shall be available at the site of the work at all times. Should an unplanned event occur or the bridge operation deviate from the approved bridge removal plan, the Contractor's registered engineer shall submit immediately to the Engineer for approval, the procedure of operation proposed to correct or remedy the occurrence.

REMOVE CONCRETE (CURB AND GUTTER)

Concrete (curb and gutter), where shown on the plans to be removed, shall be removed.

Removing concrete (curb and gutter) will be measured by the meter, measured along the curb, barrier or sidewalk before removal operations and will be paid per meter removed.

Concrete removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

REMOVE CONCRETE (SIDEWALK)

Concrete (sidewalk), where shown on the plans to be removed, shall be removed.

Concrete (sidewalk) removed will be measured and paid for per square meter.

Concrete removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

REMOVE CONCRETE (CHANNEL)

Concrete (channel), where shown on the plans to be removed, shall be removed.

The pay quantities of concrete (channel) to be removed will be measured by the cubic meter, measured before and during removal operations.

Concrete removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

10-1.27 CLEARING AND GRUBBING

Clearing and grubbing shall conform to the provisions in Section 16, "Clearing and Grubbing," of the Standard Specifications and these special provisions.

Vegetation shall be cleared and grubbed adjacent to Rte. 91 between the edge of pavement and right of way, left of station 120+60 to station 121+45, from right and left of station 121+70 to station 122+90 and left of station 128+00 to station 129+10.

Vegetation shall be cleared and grubbed only within the excavation and embankment slope lines.

3 and grubbing of vegetation shall be limited to 1.5 m outside the physical limits of the bridge or structure.

Existing vegetation outside the areas to be cleared and grubbed shall be protected from injury or damage resulting from the Contractor's operations.

Activities controlled by the Contractor, except cleanup or other required work, shall be confined within the graded areas of the roadway.

Nothing herein shall be construed as relieving the Contractor of the Contractor's responsibility for final cleanup of the highway as provided in Section 4-1.02, "Final Cleaning Up," of the Standard Specifications.

10-1.28 DUST PALLIATIVE

Furnishing and applying dust palliative shall conform to the provisions in Section 18, "Dust Palliative," of the Standard Specifications.

10-1.29 EARTHWORK

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

If the Contractor elects to use the "Weep Hole and Geocomposite Drain" alternative where permitted on the plans, the geocomposite drain shall conform to the details shown on the plans and the following:

- A. Attention is directed to "Engineering Fabrics" under "Materials" of these special provisions.
- B. Geocomposite drain shall consist of a manufactured core not less than 6.35 mm thick nor more than 50 mm thick with one or both sides covered with a layer of filter fabric that will provide a drainage void. The drain shall produce a flow rate, through the drainage void, of at least 25 liters per minute per meter of width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 168 kPa.
- C. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for the geocomposite drain certifying that the drain produces the required flow rate and complies with these special provisions. The Certificate of Compliance shall be accompanied by a flow capability graph for the geocomposite drain showing flow rates for externally applied pressures and hydraulic gradients. The flow capability graph shall be stamped with the verification of an independent testing laboratory.
- D. Filter fabric for the geocomposite drain shall conform to the provisions for fabric for underdrains in Section 88, "Engineering Fabrics," of the Standard Specifications.
- E. The manufactured core shall be either a preformed grid of embossed plastic, a mat of random shapes of plastic fibers, a drainage net consisting of a uniform pattern of polymeric strands forming 2 sets of continuous flow channels, or a system of plastic pillars and interconnections forming a semirigid mat.
- F. The core material and filter fabric shall be capable of maintaining the drainage void for the entire height of geocomposite drain. Filter fabric shall be integrally bonded to the side of the core material with the drainage void. Core material manufactured from impermeable plastic sheeting having nonconnecting corrugations shall be placed with the corrugations approximately perpendicular to the drainage collection system.
- G. The geocomposite drain shall be installed with the drainage void and the filter fabric facing the embankment. The fabric facing the embankment side shall overlap a minimum of 75 mm at all joints and wrap around the exterior edges a minimum of 75 mm beyond the exterior edge. If additional fabric is needed to provide overlap at joints and wrap-around at edges, the added fabric shall overlap the fabric on the geocomposite drain at least 150 mm and be attached thereto.
- H. Should the fabric on the geocomposite drain be torn or punctured, the damaged section shall be replaced completely or repaired by placing a piece of fabric that is large enough to cover the damaged area and provide a minimum 150-mm overlap.
- I. Plastic pipe shall conform to the provisions for edge drain pipe and edge drain outlets in Section 68-3, "Edge Drains," of the Standard Specifications.
- J. Treated permeable base to be placed around the slotted plastic pipe at the bottom of the geocomposite drain shall be cement treated permeable base conforming to the provisions for cement treated permeable base in Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.

- K. The treated permeable base shall be enclosed with a high density polyethylene sheet or PVC geomembrane, not less than 250 µm thick, which is bonded with a suitable adhesive to the concrete and geocomposite drain. Surfaces to receive the polyethylene sheet shall be cleaned before applying the adhesive. The treated permeable base shall be compacted with a vibrating shoe type compactor.

If structure excavation or structure backfill involved in bridges is not otherwise designated by type, and payment for the structure excavation or structure backfill has not otherwise been provided for in the Standard Specifications or these special provisions, the structure excavation or structure backfill will be paid for at the contract price per cubic meter for structure excavation (bridge) or structure backfill (bridge).

10-1.30 EARTH RETAINING STRUCTURES

Earth retaining structures, consisting of mechanically stabilized embankment (MSE), shall conform to the details shown on the plans and these special provisions.

At the Contractor's option, one of the following acceptable alternative earth retaining systems may be constructed:

Proprietary Earth Retaining System	Address and Phone Number
Reinforced Earth	The Reinforced Earth Company 20381 Lake Forest Drive, Suite B-2 Lake Forest, CA 92630 (949) 587-3060 www.reinforcedearth.com
Retained Earth (1.52-meter square concrete face panels)	Foster Geotechnical 1660 Hotel Circle North - Suite 304 San Diego, CA 92108 (619) 688-2400 www.lbfoster.com
MSE Plus	SSL 4740 Scotts Valley Drive, Suite "E" Scotts Valley, CA 95066 (831) 430-9300

Only one type of earth retaining system shall be used at any one location.

Only square or rectangular panels shall be allowed.

The above list of acceptable alternative earth retaining systems has been selected from the Department's current list of prequalified earth retaining systems and is limited only to those systems determined to have characteristics suitable for this project. Among the alternatives shown, some systems may be proprietary.

The list of prequalified earth retaining systems has been developed from data previously furnished by suppliers or manufacturers of each system. Approval of additional earth retaining systems is contingent on the system meeting the full range of parameters for which prequalification is required. The prequalification requirements can be obtained from the Office of Structure Design, Mail Station 9-2/9I, 1801 30th Street, Sacramento, CA 95816.

WORKING DRAWINGS

If the Contractor elects to use a proprietary earth retaining system from the list of acceptable alternative systems, the Contractor shall submit complete working drawings for each installation of the system to the Office of Structure Design (OSD) in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. For initial review, 4 sets of drawings shall be submitted. After review between 6 and 12 sets, as requested by the Engineer, shall be submitted to OSD for final approval and use during construction.

Working drawings shall be 279 mm x 432 mm in size, and each drawing and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-kilometer Post. The design firm's name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

The Contractor shall verify the existing ground elevations at the site before preparing the working drawings. The working drawings shall contain all information required for the proper construction of the system at each location including existing ground line at face of wall as verified at the site and any required revisions or additions to drainage systems or other facilities. The working drawings shall include "General Notes" which contain design parameters, material notes, and wall construction procedures. The working drawings and calculations shall be stamped and signed by an engineer who is registered as a Civil Engineer in the State of California. The Contractor shall allow the Engineer 4 weeks to review the drawings after a complete set has been received.

Unless otherwise specified, at the completion of each structure for which working drawings were submitted, and if the work detailed in these working drawings is permanent, the Contractor shall submit to the Engineer one set of corrected as-built prints 279 mm x 432 mm in size and on 75-g/m² (minimum) bond paper, showing as built conditions. As-built drawings that are common to more than one structure shall be submitted for each structure.

MATERIALS

Earthwork

Excavation and backfill shall conform to the details shown on the plans, the provisions in Section 19, "Earthwork," of the Standard Specifications, and these special provisions.

Structure backfill for earth retaining structures with metallic soil reinforcement 1) shall consist of material free from organic material and substantially free of shale or other soft, poor durability particles, 2) shall not contain slag aggregate or recycled materials such as glass, shredded tires, portland cement concrete rubble, asphaltic concrete rubble, or other unsuitable material as determined by the Engineer, and 3) shall conform to the following requirements:

Gradation Requirements		
Sieve Size	Percentage Passing	California Test
159-mm	100	202
75-mm	78 - 100	202
4.75-mm	----	202
600-m	0 - 60	202
75-m	0 - 25	202

Property Requirements Test Requirement California Test Sand Equivalent 12 min. 217 Plasticity Index 10 max. 204 Minimum Resistivity 1500 ohm-cm min. 643 Chlorides < 500 ppm 422 Sulfates < 2000 ppm 417 pH 5.5 to 10.0 643 If 12 percent or less passes the No. 75-□m sieve and 50 percent or less passes the No. 4.75-mm sieve, the Sand Equivalent and Plasticity Index requirements shall not apply.

Permeable material shall be used for the portion of the structure backfill for earth retaining structures with soil reinforcement within the limits shown on the plans. Permeable material shall be Class 1, Type B, conforming to the provisions in Section 68-1.025, "Permeable Material," of the Standard Specifications and the following requirements:

Property Requirements		
Test	Requirement	California Test
Minimum Resistivity	1500 ohm-cm min.	643
Chlorides	< 500 ppm	422
Sulfates	< 2000 ppm	417
pH	5.5 to 10.0	643

Water used for earthwork or dust control within 150 meters of the earth retaining structures with metallic soil reinforcement shall conform to the provisions for water in Section 90-2.03, "Water," of the Standard Specifications.

Concrete

Concrete used in precast and cast-in-place reinforced concrete members of earth retaining structures shall conform to the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

The concrete leveling pads for the Mechanically Stabilized Embankment (MSE) system shall conform to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications.

Reinforcement

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

Galvanizing

Soil reinforcement, connecting elements, and other steel components that are in contact with the earth shall be galvanized in conformance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications.

Inspection Wire

If a proprietary alternative system is selected, inspection elements representative of the particular soil reinforcement shall be furnished in the same number and approximate location as shown on the plans for the MSE system.

The threaded end of the inspection wire may be formed before or after galvanizing. The end 100 mm of the wire shall be coated with 2 applications of an approved unthinned commercial quality zinc-rich primer (organic vehicle type). The threaded end of the wire shall be encapsulated with corrosion inhibiting, mastic filled, round vinyl enclosure secured with a nylon tie as shown on the plans. If the threaded end is galvanized after threading, the threads shall be cleaned before painting. There shall be no damage to the unthreaded portion of the galvanized inspection wire.

Drainage System

The drainage system shall conform to the details shown on the plans and these special provisions.

Corrugated steel pipe shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications.

Perforated steel pipe underdrains and underdrain outlets and risers shall conform to the provisions in Section 68-1, "Underdrains," of the Standard Specifications.

The class of rock used for rock slope protection at drain pipe outlets shall be No. 3 Backing, and shall conform to the provisions in Section 72-2, "Rock Slope Protection," of the Standard Specifications.

Filter fabric shall conform to the provisions for fabric for underdrains in Section 88-1.03, "Filter Fabric," of the Standard Specifications, and these special provisions.

Adhesive for bonding filter fabric to concrete panels shall be commercial grade.

Soil Reinforcement

Soil reinforcement shall conform to the details shown on the plans and these special provisions.

MW70 and MW130 steel wire shall conform to the requirements in ASTM Designation: A 82. The welded wire mat shall conform to the requirements in ASTM Designation: A 185. MD70 and MD130 deformed steel wire may be substituted for MW70 and MW130 steel wire, respectively. The welded wire mat utilizing deformed steel wire shall conform to the requirements in ASTM Designation: A 496 and ASTM Designation: A 497.

The button on button-headed wires shall conform to the provisions in Section 50-1.05, "Prestressing Steel," of the Standard Specifications.

The coupler at the mat connection shall be a seamless steel sleeve. The coupler shall be applied over the button-headed wires and swaged by means of a hydraulic press. The coupler shall develop the minimum tensile strength of the wire without exceeding a total slip of the wires of 5.0 mm.

Splicing of the welded wire mat along its length shall be by a mechanical coupler, which shall develop the minimum tensile strength of the wire. The mechanical coupler shall be approved by the Engineer.

Miscellaneous

Resin bonded cork for horizontal joints shall conform to the requirements in ASTM Designation: D 1752, Type II with a compressive load of not less than 690 kPa.

Pipe for the pipe pin shall conform to the requirements in ASTM Designation: A 53, Standard weight, except the amount of the zinc coating per square meter of actual surface shall average not less than 610 g and no individual specimen shall be less than 550 g.

CONSTRUCTION

Earth retaining structures shall be constructed to the lines, grades, and details shown on the plans, and shall conform to these special provisions.

Earthwork

Structure backfill material shall be placed and compacted simultaneously with the erection of the facing panels. Placement and compaction shall be accomplished without distortion of the soil reinforcement or displacement of facing panels. Structure backfill at the front of the wall shall be completed prior to backfilling more than 4 m above the bottom of the lowermost face element.

Structure backfill for earth retaining structures with soil reinforcement shall be compacted to a relative compaction of not less than 90 percent, except when the backfill is within 50 meters of a bridge abutment or for a minimum depth of one meter below the grading plane for the width between the outer edges of shoulders, the backfill shall be compacted to a relative compaction of not less than 95 percent.

A relative compaction of not less than 95 percent shall be obtained for embankment under earth retaining structures with soil reinforcement within the limits established by inclined planes sloping 1:1.5 (vertical:horizontal) out and down from lines 0.3-m outside the bottom limits of structure backfill, including permeable material when required.

Sheepsfoot or grid-type rollers shall not be used for compacting material within the limits of the soil reinforcement. Hand-held or hand-guided compacting equipment shall be used to compact structure backfill material within one meter of the facing panels.

At each level of the soil reinforcement the structure backfill shall be constructed to a plane 45 mm above the elevation of the soil reinforcement connection and shall start one meter from the back of the face panel and extend for at least the remaining length of soil reinforcement. This grading shall be complete before placing the next layer of soil reinforcement.

Permeable material and filter fabric shall be placed along with structure backfill as shown on the plans. Compaction of the permeable material for the drainage system outside the limits of the soil reinforcement is not required, and equipment shall not be operated directly on the permeable material or filter fabric. If a sloped layer of permeable material is placed to facilitate the work or to satisfy safety considerations, the vertical limits of permeable material shall remain unchanged, and the thickness of the layer of permeable material shall be measured normal to the slope.

Permeable material shall be placed in layers not exceeding 0.6-m in thickness.

Filter Fabric

Filter fabric shall be placed at the locations and in conformance with the details shown on the plans and these special provisions.

Immediately prior to placing filter fabric, the subgrade to receive the filter fabric shall conform to the compaction and elevation tolerance specified for the material involved and shall be free of loose or extraneous material and sharp objects that may damage the filter fabric during installation.

Filter fabric shall be handled and placed in conformance with the manufacturer's recommendations.

Filter fabric shall be stretched, aligned, and placed in a wrinkle-free manner.

Adjacent borders of filter fabric shall be stitched or overlapped from 300 mm to 450 mm. The preceding roll shall overlap the following roll in the direction the material is being spread or shall be stitched. When filter fabric is joined by stitching it shall be stitched with yarn of a contrasting color. The size and composition of the yarn shall be as recommended by the filter fabric manufacturer. The stitches shall number 2 to 3 per centimeter of seam.

If the filter fabric is damaged during installation, it shall be repaired by placing a piece of filter fabric that is large enough to cover the damaged area and which meets the overlap requirement.

During spreading of the permeable material, a minimum of 150 mm of the material shall be maintained between the filter fabric and the Contractor's equipment. Where structure backfill material is to be placed on filter fabric, a minimum of 450 mm of structure backfill material shall be maintained between the filter fabric and the Contractor's equipment. Equipment or vehicles shall not be operated or driven directly on filter fabric.

Concrete

Concrete for the leveling pads shall be placed at least 24 hours prior to erecting face panels.

Mechanically Stabilized Embankment System

If the Contractor elects to construct one of the earth retaining structures shown on the plans, the structure shall conform to the lines, grades, and details shown on the plans and these special provisions.

Concrete panel surfaces, which are to receive filter fabric, shall be dry and thoroughly cleaned of dust and deleterious materials.

After placement of an inspection element and placement of backfill to a level at least 0.6-m above the inspection element, the void in the face panel shall be dry packed with portland cement mortar as shown on the plans. Dry pack shall conform to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications, except that the proportion of cement to sand shall be that required to achieve a 28-day mortar compressive strength of 7 MPa to 10 MPa.

Proprietary Earth Retaining Systems

If the Contractor elects to construct one of the acceptable proprietary alternative earth retaining systems, the structure shall be constructed to the lines and grades shown on the plans. Vertical and horizontal alignment shall be checked at every course throughout the erection process. The construction shall include a drainage system where shown on the plans, and shall conform to the details shown on the approved working drawings, approved proprietary system details, and these special provisions.

The top of wall profile of alternative earth retaining systems shall conform to the profile shown on the plans. The bottom of face panels shall be at or below the elevations shown on the plans. The height and length to be used for any system shall be the minimums for that system that will effectively retain the earth behind the structure for the loading conditions and the contours, profile, or slope lines shown on the plans. In addition, if the plans or special provisions indicate limiting parameters for alternative systems, the system shall conform to those parameters.

The top of face panels, assuming no leveling pad settlement, shall be covered by the coping lip or concrete barrier slab lip at a minimum of 170 mm. The coping height may be increased from 460 mm to 600 mm maximum along the entire length of the wall at the Contractor's expense.

The top level of soil reinforcement shall be placed parallel to the top of the concrete panel at a distance below the top of the wall as shown on the plans. The top level of soil reinforcement shall also be 1) placed a minimum of 75 mm below the bottom of the barrier slab lip or the bottom of the concrete gutter behind coping and 2) placed a minimum of 125 mm below the top edge of the concrete panel.

MEASUREMENT AND PAYMENT

Earth retaining structures will be measured and paid for by the square meter. Regardless of the type of earth retaining structure actually constructed, the square meter area for payment will be based on the length and vertical height of each section of mechanically stabilized embankment system shown on the plans which was or would have been constructed. The vertical height of each section will be taken as the difference in elevation on the outer face from the bottom of the lowermost face element to the top of wall profile.

The contract price paid per square meter for earth retaining structure at each location shown on the plans shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the earth retaining structure and inspection elements, including earthwork, leveling pad, coping, bearing pads, and drainage systems, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per cubic meter for structural concrete, barrier slab shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the barrier slab, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.31 TEMPORARY RETAINING WALL

Temporary retaining wall shall be designed, constructed, and maintained as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

The temporary retaining wall shall last for at least 2 years and remain in place.

Within 30 days after the approval of the contract, the Contractor shall submit complete working drawings for the temporary retaining wall to the Engineer for review in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. Four sets of drawings and 2 copies of the design calculations including criteria as basis of the temporary retaining wall designs shall be submitted to the Engineer. The Contractor shall allow the Engineer 30 working days to review the drawings and design calculations after a complete submittal has been received. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the drawings and calculations within 15 working days of receipt of the Engineer's comments and shall allow 30 working days for the Engineer to review the revisions. Upon the Engineer's approval of the drawings and design calculations, 4 additional sets of drawings and 2 copies of the design calculations, incorporating the required changes, shall be submitted to the Engineer.

Working drawings shall be either 280 mm x 432 mm, or 560 mm x 864 mm in size and each drawing and calculation sheet shall include the State assigned designations for the contract number and District-County-Route-Kilometer Post. The design firm's name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

The Contractor shall verify the existing ground elevations at the site prior to preparing the working drawings. Said working drawings shall contain all information required for the proper construction of the temporary retaining wall, including existing ground line at face of wall as verified at the site and any required revisions or additions to drainage systems or other facilities. The working drawings shall be supplemented as necessary with calculations for the particular installation. Said working drawings and calculations shall be stamped and signed by an engineer who is registered as a Civil Engineer in the State of California.

The Contractor shall not commence constructing temporary retaining wall until the Engineer has reviewed and approved the working drawings in writing.

Approval by the Engineer of the temporary retaining wall drawings or the inspection performed by the Engineer will in no way relieve the Contractor of full responsibility for the temporary retaining wall.

EARTHWORK.

Excavation and backfill shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications, and these special provisions.

The Contractor shall substantiate all values used in the design of the temporary retaining wall shown on the working drawings.

MATERIAL.

All material shall comply to the provisions of the applicable sections of the Standard Specification and these special provisions.

MEASUREMENT AND PAYMENT.-

Temporary retaining wall will be measured and paid for by the square meter. Regardless of the type of temporary retaining wall actually constructed, the square meter area for payment will be based on the vertical height and length of each section which was constructed. The vertical height of each section will be taken as the difference in elevation on the outer face, from the existing ground elevation to the top of wall profile complete in place.

The contract price paid per square meter for temporary retaining wall shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in temporary retaining wall, complete in place, including designing, preparing working drawings, constructing (including structure excavation and structure backfill), maintaining, and leaving in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.32 SOIL NAIL WALL EARTHWORK

Soil nail wall earthwork consisting of excavation, drilling holes for installation of soil nail assemblies, and backfilling around the completed wall shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications and these special provisions.

WORKING DRAWINGS

The Contractor shall submit complete working drawings for earthwork for each soil nail wall to the Division of Structure Design (DSD) in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. All working drawings for wall earthwork shall be 559 mm by 864 mm in size. For initial review, 5 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to DSD for final approval and use during construction.

Working drawings for wall earthwork shall show the State assigned designations for the contract number, structure number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer Post on each drawing and calculation sheet. The Contractor name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner.

Working drawings for wall earthwork shall contain all information required for the construction and quality control of the earthwork, including the following:

- A. The proposed schedule and detailed construction sequence. Construction sequence shall include measures to ensure wall and slope stability during all stages of wall construction including provisions for discontinuous rows of nails.
- B. Methods of excavation to the staged lifts indicated and excavation equipment types.
- C. Temporary shoring plans.
- D. Drilling methods and equipment including proposed drill hole size and any variation of these along the alignments.
- E. Information on space requirements for installation equipment.
- F. A detailed construction dewatering plan addressing all elements necessary to divert, control and dispose of surface water.

A supplement to the working drawings shall include the following:

- A. Independently checked calculations for wall and slope stability during various stages of wall construction including geotechnical assessment of information provided by the Department for this contract. At the Contractor's option, the Contractor may conduct additional geotechnical investigation for the purpose of developing wall earthwork working drawings.
- B. Information on provisions for working in the proximity of underground facilities.

The working drawings and supplement shall be stamped and signed by an engineer who is registered as a Civil Engineer in the State of California.

The Contractor shall allow the Engineer 4 weeks to review the working drawing submittal after a complete set has been received.

Should the Engineer fail to review the complete working drawing submittal within the time specified and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the wall earthwork working drawing submittal, an extension of time commensurate with the delay in completion of the work thus caused will be granted in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

EXCAVATION

Care shall be taken during excavation for soil nail walls to prevent disturbing the natural foundation materials behind the face of excavation. During initial mass grading, the Contractor shall not excavate the full wall height to the wall alignment as shown on the plans, but the Contractor shall maintain a working berm of native material in front of the wall to serve as a work bench for the drill equipment. The working berm shall extend out from the wall a minimum distance of 5 m and shall be cut down from that point at the slope shown on the approved wall earthwork working drawings. The original ground beyond the wall alignment for the back or ends of the wall as shown on the plans shall not be over excavated. Any such over excavation shall be restored by the Contractor, at the Contractor's expense, using methods and materials approved in writing by the Engineer. Soil stabilization methods or temporary backing or lagging placed behind the excavation face may be required to prevent disturbing the natural foundation materials.

Excavation for walls shall be limited to that area which can be nailed and covered with shotcrete during the same work shift in which the excavation is done. Subsequent excavation shall not be made within 3 m of previously nailed and covered portions of the wall until those nailed and covered portions are structurally complete. A portion of the wall will be considered structurally complete when the soil nail assemblies have been installed, the shotcrete cover has set, specified testing has been completed for that portion of the wall, and the test results have been furnished to the Engineer.

Excavation to the final wall alignment for the full wall height shall incorporate a working berm which shall be constructed from the top down in a staged lift sequence as shown on the approved wall earthwork working drawings. The ground level in front of the wall face shall not be excavated more than one meter below the level of the row of soil nails to be installed in that same lift.

At the option of the Contractor, the Contractor may maintain a stabilizing berm to support the excavation face during nail installation. The stabilizing berm shall extend horizontally from the bottom of the shotcrete a minimum distance of 0.3-m and shall be cut down from that point at a slope as shown on the approved wall earthwork working drawings.

After soil nails are complete in place for a given lift, the stabilizing berm shall be removed during excavation to the final wall alignment. The complete excavated face shall be cleaned of all loose materials, mud, rebound, and other materials that could prevent or reduce shotcrete bond to the excavated face and soil nails.

Temporary backing or lagging for excavation at walls may be left in place if approved in writing by the Engineer. There shall be no voids behind wall temporary backing or lagging that is left in place. Fillers used to eliminate voids between the excavation face and temporary backing or lagging shall be dimensionally stable, non-deteriorating material capable of supporting the earth pressures in both water saturated and dry conditions.

Timber backing or lagging at walls which is to remain in place and is greater than one inch total thickness shall be pressure treated with wood preservative for soil and fresh water use in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," of the Standard Specifications. Wood preservative shall be one of the following: creosote, creosote-coal tar solution, pentachlorophenol, copper naphthenate, ammonia copper arsenate, ammoniacal copper zinc arsenate, acid copper chromate, or chromated copper arsenate.

The Contractor shall remove all cobbles, boulders or portions of boulders, rubble, or debris which are encountered at the final wall alignment during wall face excavation and which protrude from the excavated face more than 50 mm into the design shotcrete thickness as shown on the plans. Such over excavation shall be backfilled with shotcrete.

The Contractor shall immediately notify the Engineer of the occurrence of raveling or local instability of the final wall face excavation due to the presence of groundwater, soil conditions, equipment vibration, or other causes.

Unstable areas shall be temporarily stabilized by means of buttressing the exposed excavation face with an earth berm or other methods approved in writing by the Engineer. Construction of the wall in unstable areas shall be suspended until remedial measures, submitted by the Contractor, and approved by the Engineer, have been taken.

The Contractor shall protect installed nails during excavation and subsequent operations. Any nails damaged during construction shall be replaced by the Contractor, at the Contractor's expense.

MEASUREMENT AND PAYMENT

Excavation for soil nail wall construction will be measured and paid for as structure excavation (soil nail wall).

Full compensation for working drawings and supplements, and for furnishing, constructing and removing shoring, working berms, and stabilizing berms, if required, for soil nail wall construction shall be considered as included in the contract price paid per cubic meter for structure excavation (soil nail wall) and no additional compensation will be allowed therefor.

Full compensation for shotcrete used to fill voids created by the removal of cobbles and boulders or other obstructions shall be considered as included in the contract price paid per cubic meter for shotcrete and no additional compensation will be allowed therefor.

10-1.33 SOIL NAIL ASSEMBLY

Soil nail assemblies and test soil nail assemblies, consisting of drilling holes in natural foundation materials, installing and grouting steel bars in drilled holes, anchorage systems, and testing of test soil nail assemblies, shall conform to the details shown on the plans and the provisions of the Standard Specifications and these special provisions.

Foundation recommendations are included in the "Information Handout" available to the Contractor in conformance with the provisions in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

Attention is directed to "Soil Nail Wall Earthwork," of these special provisions.

WORKING DRAWINGS

The Contractor shall submit a complete working drawing submittal for soil nail assemblies to the Division of Structure Design (DSD) in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. All working drawings for soil nail assemblies shall be 559 mm by 864 mm in size. For initial review, 5 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to DSD for final approval and use during construction.

Working drawing submittals shall be submitted sufficiently in advance of the start of the work to allow time for review by the Engineer and correction by the Contractor, without delaying the work.

Working drawing submittals for soil nail assemblies shall show the State assigned designations for the contract number, structure number, full name of the structure as shown on the contract plans, and District-County-Route-kilometer post on each drawing and calculation sheet. The Contractor's name, address, and phone and FAX numbers shall also be shown on the working drawings. Each working drawing sheet shall be numbered in the lower right hand corner of the sheet.

Working drawings for soil nail assemblies shall contain all information required for the construction and quality control of the soil nail wall, including the following:

- A. The proposed schedule and detailed construction sequence of the installation and grouting of soil nails, application of shotcrete and construction of cast-in-place reinforced concrete.
- B. Complete details and specifications of the soil nail and test soil nail, including encapsulation materials and method of grouting the encapsulation, anchorage system, and type of packers or other appropriate devices to be used to ensure partial length grouting of test soil nails.
- C. Grout mix designs and procedures involved in testing grout.
- D. Grout placement procedures and equipment including minimum required cure time.
- E. Details of the equipment proposed for testing soil nails including jacking frame and appurtenant bracing, and the method and equipment for determining any displacement of the test soil nail relative to the grout during applications of test loads.
- F. Information on space requirements for installation equipment.
- G. Drilling methods and equipment.

The working drawing submittal shall be stamped and signed by an engineer who is registered as a Civil Engineer in the State of California.

The Contractor shall allow the Engineer 4 weeks to review the soil nail working drawing submittal after a complete set has been received. No soil nails shall be fabricated and installed until the Engineer has approved, in writing, the working drawing submittal for soil nail assemblies.

Should the Engineer fail to review the complete working drawing submittal within the time specified, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the soil nail working drawing submittal, an extension of time commensurate with the delay in completion of the work thus caused will be granted in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

MATERIALS

The materials specified below shall be used for construction of soil nail assemblies and test soil nail assemblies.

Soil Nail

Soil nails shall conform to the provisions for bar reinforcement in Section 52, "Reinforcement," of the Standard Specifications. When Grade 420 soil nails are shown on the plans, the soil nails shall also conform to the requirements in ASTM Designation: A 615/A 615M or A706/A706M. When Grade 520 soil nails are shown on the plans, the soil nails shall also conform to the requirements in ASTM Designation: A 615/A 615M. The soil nail shall be either a reinforcing bar encapsulated full length in a grouted corrugated plastic sheathing or an epoxy coated reinforcing bar partially encapsulated in a grouted corrugated plastic sheathing. The bar shall be centered in the sheathing and the space between the sheathing and the bar shall be filled with grout. The epoxy coating shall have a minimum thickness of 305 μm .

Soil nail assemblies shall be lengthened or additional soil nail assemblies shall be installed when ordered by the Engineer. The lengthening or addition of soil nail assemblies, when ordered by the Engineer, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Soil nails shall have a minimum length of 150 mm of thread on the anchorage end. Threading may be continuous spiral deformed ribbing provided by the bar deformations or may be cut into a reinforcing bar. If threads are cut into a reinforcing bar, the bar size shall be the next larger bar designation number from that shown on the plans and coarse threads shall be used. The epoxy coating at the anchorage end of epoxy coated bars may be omitted for a maximum length of 150 mm. Metal surfaces of assembled splices of epoxy coated bars shall be epoxy coated.

Corrugated plastic sheathing shall be either polyvinyl chloride (PVC) or high density polyethylene (HDPE). The minimum sheathing wall thickness shall be 1.0 mm.

HDPE shall have a density between 0.940 and 0.960-gram/cm³ when measured in conformance with the requirements in ASTM Designation: D 792, A-2.

The sheathing shall have sufficient strength to prevent damage during construction operations, shall be watertight, chemically stable without embrittlement or softening, and nonreactive with concrete.

Splicing of soil nails shall be made only at the locations shown on the plans or at ends of soil nails which the Engineer has ordered to be lengthened.

Test Soil Nail

Test soil nails shall conform to the provisions for bar reinforcement in Section 52, "Reinforcement," of the Standard Specifications, and shall be of a size and grade determined by the Contractor.

Test soil nail assemblies shall be lengthened or additional test soil nail assemblies shall be installed when ordered by the Engineer. The lengthening or addition of test soil nail assemblies, when ordered by the Engineer, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Test soil nails need not be epoxy coated or encapsulated in grouted plastic sheathing.

Splicing of test soil nails shall be made only at locations outside of the bonded length.

Anchorage System

Anchorage for soil nails shall conform to the details shown on the plans and the provisions in Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications except that nuts, washers, wedges, and bearing plates to be fully encased in concrete, grout, or shotcrete need not be galvanized. Concrete anchors on the bearing plates shall conform to the provisions for stud connectors in Section 55-2, "Materials," of the Standard Specifications.

The ultimate strength of the soil nail anchorage shall be at least the value shown below for the size of the soil nail bar shown on the plans.

BAR SIZE	ANCHORAGE ULTIMATE STRENGTH (kilonewtons)	
	Grade 420	Grade 520
No. 16	123	137
No. 19	178	198
No. 22	240	267
No. 25	314	350
No. 29	401	446
No. 32	508	565

Grout

Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. California Test 541 will not be required nor will the grout be required to pass through a screen with a 1.80-mm maximum clear opening prior to being introduced into the grout pump. Fine aggregate may be added to the grout mixture of portland cement and water in drilled holes 150 mm or greater in diameter, but only to the extent that the cement content of the grout is not less than 600 kilograms per cubic meter of grout. Fine aggregate, if used, shall conform to the provisions in Section 90-2, "Materials," and Section 90-3, "Aggregate Gradings," of the Standard Specifications. Grout with fine aggregate shall have a nominal penetration equal to or greater than 90 mm when measured in conformance with California Test 533, and shall have an air content of equal to or less than 2 percent when measured in conformance with California Test 504. Air entraining admixtures shall not be used for grout with fine aggregate.

The consistency of grout with fine aggregate shall be verified prior to use by producing a batch to be tested. The test batch shall be produced and delivered to the project under conditions and in time periods similar to those expected during the placement of grout in the soil nails. Grout for the test batch shall be placed in an excavated hole or suitable container of adequate size to allow testing in conformance with California Test 533. The test batch shall demonstrate that the proposed grout mix achieves the specified nominal penetration. Upon completion of the testing, the grout shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

CONSTRUCTION

Soil nails shall be installed in drilled holes in an expeditious manner so that caving or deterioration of the drilled hole does not occur. No portion of the drilled hole shall be left open for more than 60 minutes prior to soil nail placement and grouting unless otherwise approved by the Engineer.

Drilling

Drilling equipment shall be designed to drill straight and clean holes. The drilling method and the size and capability of the drilling equipment shall be as approved in the working drawings. Drill rigs shall have the capability of anchorage installation and grout placement through the use of drill casing or hollow-stem augers. When caving conditions are anticipated, sufficient casing and auger lengths shall be available on site to maintain uninterrupted installation of anchors.

Where hard drilling conditions such as rock, cobbles, boulders, or obstructions are anticipated, a down hole pneumatic hammer drill rig and drill bit shall be available on site to drill holes for soil nail assemblies.

Drilled holes for walls shall not extend beyond the right-of-way or easement limits as shown on the plans or as specified in these special provisions.

Holes shall be drilled in the natural foundation materials. Holes for test soil nail assemblies shall be of the same diameter as those for the production soil nail assemblies they represent.

Holes shall be cleaned to remove material resulting from the drilling operations and to remove any other material that would impair the strength of the soil nail assemblies or test soil nail assemblies. Foreign material dislodged or drawn into the holes during construction of the assemblies shall be removed. Water for cleaning holes shall not be used, unless full hole length hollow-stem augers or casing is maintained in the same hole during cleaning and soil nail assembly installation. Soil nail assemblies and test soil nail assemblies shall not be installed in the drilled holes until the holes have been inspected by the Engineer.

Installing Soil Nails and Test Soil Nails

Soil nails and test soil nails shall be installed in the drilled holes using centralizers. Centralizers shall adequately support the bar in the center of the drilled hole and shall be spaced at a maximum of 1.5 m on center along the length of the bar, and 0.5-m from the end of the bar.

Where the soil nail cannot be completely inserted, the Contractor shall remove the bar and clean or redrill the hole to permit unobstructed installation. Partially installed bars shall not be driven or forced into the drilled hole and will be rejected. When open-hole drilling methods are being used, the Contractor shall have hole cleaning tools on-site suitable for cleaning drilled holes along their full length just prior to bar insertion and grouting.

Grouting

The length of drilled hole shall be verified and recorded by the Contractor before grouting.

Grout shall be injected at the low end of the drilled hole and shall fill the drilled hole with a dense grout free of voids or inclusion of foreign material. Cold joints shall not be used in grout placement. Soil nails shall be grouted full length.

Only the bonded length of test soil nails shall be initially grouted. Initial grouting shall be confined to the bonded length by packers or other approved devices. For test soil nails, grouting of the remainder of the drilled hole shall not be done until

pullout tests have been completed and approved by the Engineer.

After placing the grout for soil nails and test soil nails, they shall remain undisturbed for the cure time stated in the approved soil nail working drawings.

Securing Soil Nails

Any remaining void at the exterior end of the drilled hole for a soil nail assembly shall be filled with shotcrete and the soil nail secured at the face of the shotcrete. The steel bearing plate shall be seated with full bearing on the shotcrete surface and the nut for the soil nail shall be hand tightened before the initial set of the shotcrete. The nut shall be made wrench tight after the shotcrete has set for 24 hours, unless a shorter time is approved by the Engineer.

Securing Test Soil Nails

Testing shall be performed against a temporary bearing yoke which bears directly on the shotcrete facing. Test loads transmitted through the temporary bearing yoke shall not fracture the shotcrete or cause displacement or sloughing of the soil surrounding the drilled hole. No part of the yoke shall bear within 150 mm of the edge of blockout.

Test soil nails shall be removed to behind the front face of the shotcrete after testing has been completed. The remaining length of void in the drilled hole shall be grouted and the blockout in the shotcrete facing filled with either grout or shotcrete.

TESTING

Test soil nail assemblies shall be pullout tested by the Contractor in the presence of the Engineer. A pullout test shall consist of incrementally loading the assembly until one of the following conditions has been reached: 1) the maximum test load, 2) the point where the movement of the test soil nail continues without an increase in the load, or 3) the point when the soil nail has displaced 50 mm. This load at which this condition is reached shall be recorded as part of the test data.

The Contractor shall monitor and record displacement of the test soil nail relative to the grout during application of the test load.

Applied test loads shall be determined by using either a calibrated pressure gage or a load cell. Movements of the end of the soil nail, relative to an independent fixed reference point, shall be measured and recorded to the nearest 25 μ m at each increment of load, including the ending alignment load, during the load tests.

The pressure gage shall have an accurately reading dial at least 150 mm in diameter and each jack and its gage shall be calibrated as a unit with the cylinder extension in the approximate position that it will have at final jacking force, and shall be accompanied by a certified calibration chart. The load cell shall be calibrated and shall be provided with an indicator by means of which the test load in the soil nail may be determined. The range of the load cell shall be such that the lower 10 percent of the manufacturer's rated capacity will not be used in determining the jacking force.

The test load may be verified by State forces with either State-furnished load cells or pressure cells, or with State-furnished Vibra-Tension equipment operated in conformance with the requirements of California Test 677. The Contractor shall provide sufficient labor, equipment, and material to install and support such testing equipment at the soil nails and to remove the testing equipment after the testing is complete, as ordered by the Engineer.

The pullout test procedures shall conform to the following:

- A. The pullout test shall be conducted by measuring and recording the test load applied to the test soil nail and the test soil nail end movement at each load listed in the following loading schedule.

PULLOUT TEST LOADING SCHEDULE

AL
0.10M
0.20M
0.30M
0.40M
0.50M
0.60M
0.70M (PULLOUT TEST LOAD)
0.80M
0.90M
1.00M
AL

(M = MAXIMUM TEST LOAD (kN) = $0.0141\sigma_b D$)

Where σ_b =Ultimate bond stress between grout and drilled hole as shown on the plans, in kPa; and D=actual drilled hole diameter, in millimeters.

(AL = ALIGNMENT LOAD = 0.1M)

- B. Each increment of load shall be applied in less than one minute and held for at least one minute but not more than 2 minutes, except that load equal to 0.70M shall be held for 10 minutes. During the 10-minute load hold, the movement of the end of the soil nail shall be measured at 1, 2, 3, 4, 5, 6, and 10 minutes. The observation period for the 10-minute load hold shall start when the pump begins to apply the increment of load from 0.60M to 0.70M. If the movement measured between one minute and 10 minutes is less than 2 mm, the load shall continue to be increased incrementally to 1.0M, then reduced to the ending alignment load.
- C. If the load of 0.70M cannot be maintained for 10 minutes with 2 mm or less movement, the 0.70M load shall be maintained for an additional 50 minutes. Total movement shall be measured at 15, 20, 25, 30, 45, and 60 minutes. After the 60 minute movement measurement, the load shall continue to be increased incrementally to 1.0M, then be reduced to the ending alignment load.
- D. The soil nail shall be unloaded only after completion of the test.

If a test soil nail fails to achieve the load equal to 0.70M, that soil nail shall be extracted when requested by the Engineer. Full compensation for extracting test soil nails shall be considered as included in the contract price paid per meter for soil nail assembly, and no separate payment will be made therefor.

The Contractor shall furnish to the Engineer complete test results for each soil nail assembly tested. Data for each test shall list key personnel, test loading equipment, test soil nail location, hole diameter and depth, bonded length, type of soil, method of drilling, and amount of ground water encountered within the bond length. Test data shall also include the dates and times of drilling, test soil nail installation, grouting, and testing. The test load and amount of displacement shall be included in the test data when any displacement of the test soil nail relative to the grout occurs during application of the test load.

MEASUREMENT

Soil nail assembly and test soil nail assembly will be measured and paid for by the meter. The length to be paid for will be the length of soil nail assembly or test soil nail assembly measured along the bar centerline from the back face of shotcrete to the tip end shown on the plans or ordered in writing by the Engineer.

PAYMENT

The contract price paid per meter for soil nail assembly shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the soil nail assemblies, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Test soil nail assemblies will be paid for as soil nail assembly.

Full compensation for testing of the test soil nail assemblies shown on the plans shall be considered as included in the contract price paid per meter for soil nail assembly, and no separate payment will be made therefor.

Full compensation for repair of all damage to existing structures, restoration of grade in subsided areas, and all other damage done by drilling shall be considered as included in the contract price paid per meter for soil nail assembly, and no additional compensation will be allowed therefor.

Full compensation for furnishing, installing, and removing casing shall be considered as included in the contract price paid per meter for soil nail assembly, and no additional compensation will be allowed therefor.

The quantities of trial batch grout will not be included in any contract item of work, and full compensation for furnishing, producing, and disposing of trial batches shall be considered as included in the contract price paid per meter for soil nail assembly, and no additional compensation will be allowed therefor.

10-1.34 MATERIAL CONTAINING AERIALY DEPOSITED LEAD

Earthwork involving materials containing aerially deposited lead shall conform to the provisions in "Earthwork" and this section "Material Containing Aerially Deposited Lead" of these special provisions.

Attention is directed to "Aerially Deposited Lead" of these special provisions.

LEAD COMPLIANCE PLAN

The Contractor shall prepare a project specific Lead Compliance Plan to prevent or minimize worker exposure to lead while handling material containing aerially deposited lead. Attention is directed to Title 8, California Code of Regulations,

Section 1532.1, "Lead," for specific Cal-OSHA requirements when working with lead.

The Lead Compliance Plan shall contain the elements listed in Title 8, California Code of Regulations, Section 1532.1(e)(2)(B). Before submission to the Engineer, the Lead Compliance Plan shall be approved by an Industrial Hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene. The Plan shall be submitted to the Engineer for review and acceptance at least 15 days prior to beginning work in areas containing aurally deposited lead.

The Contractor shall not work in areas containing aurally deposited lead within the project limits, unless authorized in writing by the Engineer, until the Engineer has accepted the Lead Compliance Plan.

Prior to performing work in areas containing aurally deposited lead, personnel who have no prior training or are not current in their training status, including State personnel, shall complete a safety training program provided by the Contractor. The safety training program shall meet the requirements of Title 8, California Code of Regulations, Section 1532.1, "Lead."

Personal protective equipment, training, and washing facilities required by the Contractor's Lead Compliance Plan shall be supplied to State personnel by the Contractor. The number of State personnel will be two.

The Engineer will notify the Contractor of acceptance or rejection of any submitted or revised Lead Compliance Plan not more than 10 days after submittal of the plan.

The contract lump sum price paid for Lead Compliance Plan shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in preparing the Lead Compliance Plan, including paying the Certified Industrial Hygienist, and for providing personal protective equipment, training and medical surveillance, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.35 EROSION CONTROL (TYPE D)

Erosion control (Type D) shall conform to the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions and shall consist of applying erosion control materials to embankment and excavation slopes and other areas disturbed by construction activities, excluding rock blanket (Type 1) areas, mulch areas and planting areas as specified under roadside clearing elsewhere in these special provisions.

Prior to installing erosion control materials, soil surface preparation shall conform to the provisions in Section 19-2.05, "Slopes," of the Standard Specifications, except that rills and gullies exceeding 50 mm in depth or width shall be leveled. Vegetative growth, temporary erosion control materials, and other debris shall be removed from areas to receive erosion control.

MATERIALS

Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and these special provisions.

Seed

Seed shall conform to the provisions in Section 20-2.10, "Seed," of the Standard Specifications. Individual seed species shall be measured and mixed in the presence of the Engineer.

Seed shall be delivered to the project site in unopened separate containers with the seed tag attached. Containers without a seed tag attached will not be accepted.

A sample of approximately 30 g of seed will be taken from each seed container by the Engineer.

Legume Seed

Legume seed shall be pellet-inoculated or industrial-inoculated and shall conform to the following:

- A. Inoculated seed shall be inoculated in conformance with the provisions in Section 20-2.10, "Seed," of the Standard Specifications.
- B. Inoculated seed shall have a calcium carbonate coating.
- C. Industrial-inoculated seed shall be inoculated with Rhizobia and coated using an industrial process by a manufacturer whose principal business is seed coating and seed inoculation.
- D. Industrial-inoculated seed shall be sown within 180 calendar days after inoculation.

E. Legume seed shall consist of the following:

LEGUME SEED		
Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Lotus Scoparius (Deerweed)	30	4.00
Lunus Succulentus (Arroyo Lupine)	40	1.00
Lupinus Bicolor Pigmy-Leaved Lupine	40	2.00

Non-Legume Seed

Non-legume seed shall consist of the following:

NON-LEGUME SEED		
Botanical Name (Common Name)	Percent Germination (Minimum)	Kilograms Pure Live Seed Per Hectare (Slope Measurement)
Abronia Villosa Hairy Sand Verbena	20	2.00
Lasthenia California Dwarf Goldfields	30	2.00
Salvia Columbariae Chia	30	0.50
Eriophyllum Confertiflorum Golden Yarrow	30	2.00
Eschscholzia Caloformia California Poppy	40	3.00
Croton Setiger Doveweed	20	0.50
Helianthemum Scoparium Common Rockrose	30	2.00
Layia Platyglossa Tidy Tips	30	2.00
Nassella Lepda Foothill Needlegrass	30	2.00

Commercial Fertilizer

Commercial fertilizer shall conform to the provisions in Section 20-2.02, "Commercial Fertilizer," of the Standard Specifications and shall have a guaranteed chemical analysis of 16 percent nitrogen, 20 percent phosphoric acid and 0 percent water soluble potash.

Straw

Straw shall conform to the provisions in Section 20-2.06, "Straw," of the Standard Specifications and these special provisions.

Straw shall be derived from rice.

Stabilizing Emulsion

Stabilizing emulsion shall conform to the provisions in Section 20-2.11, "Stabilizing Emulsion," of the Standard Specifications and these special provisions.

Stabilizing emulsion shall be in a dry powder form, may be reemulsifiable, and shall be a processed organic adhesive used as a soil tackifier.

APPLICATION

Erosion control materials shall be applied in separate applications in the following sequence:

- A. The following mixture in the proportions indicated shall be applied with hydro-seeding equipment within 60 minutes after the seed has been added to the mixture:

Material	Kilograms Per Hectare (Slope Measurement)
Legume Seed	7.00
Non-Legume Seed	16.00
Fiber	800
Commercial Fertilizer	300

- B. Straw shall be applied at the rate of ____ tonnes per hectare based on slope measurements. Incorporation of straw will not be required. Straw shall be distributed evenly without clumping or piling.
- C. The following mixture in the proportions indicated shall be applied with hydro-seeding equipment:

Material	Kilograms Per Hectare (Slope Measurement)
Fiber	800
Stabilizing Emulsion (Solids)	800

The ratio of total water to total stabilizing emulsion in the mixture shall be as recommended by the manufacturer.

Once straw work is started in an area, stabilizing emulsion applications shall be completed in that area on the same working day.

The proportions of erosion control materials may be changed by the Engineer to meet field conditions.

10-1.36 ROCK BLANKET (TYPE 1)

Rock blanket (Type 1) shall be placed as shown on the plans and in conformance with these special provisions.

MATERIALS

Rock for the rock blanket (Type 1) shall be clean, smooth rock light to medium gray in color and shall be obtained from a single source.

Rock for the rock blanket (Type 1) shall conform to the following grading:

Screen Size (Millimeters)	Percentage Passing (By Mass)
300X300	100
200X200	0
200	0

A sample of the rock shall be submitted to the Engineer for approval prior to delivery of the rock to the project site.

The rock blanket (Type 1) shall be secured in place with Class 2 concrete conforming to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions. The aggregate size shall be 10 mm maximum.

Gaps between the rocks shall be filled with dry applied mortar. Mortar shall be thoroughly mixed and shall be one part Portland cement and two parts sand by volume. Sand shall be well graded and of a size that passes a 2.4 mm sieve.

SITE PREPARATION

Prior to beginning rock blanket (Type 1) work, areas to receive the rock blanket (Type 1) shall be cleared in conformance with the provisions in "Roadside Clearing" of these special provisions.

After clearing, the areas shall be excavated to the depth shown on the plans, graded to a smooth uniform surface and compacted to a minimum relative density of 90 percent on slopes of 1:3 or flatter and 85 percent on slopes steeper than 1:3. Excess material shall be removed and disposed of outside the highway right of way in accordance with the provisions specified in Section 7-1.13, "Disposal of Material Outside the Highway right of way" of the Standard Specifications..

After compaction, the areas including openings at existing sign posts, fence posts and panel markers shall be sterilized with dichlobenil. The sterilant shall be applied at the maximum label rate unless otherwise directed by the Engineer and shall not be applied more than 300 mm beyond the rock blanket (Type 1) limits. Soil sterilant shall conform to the provisions in Section 20-4.026, "Pesticides," of the Standard Specifications, except recommendations from a licensed Pest Control Adviser will not be required.

PLACEMENT

Rock shall be secured in place with concrete in conjunction with wood headers and metal stakes and imbedded in the concrete and securely set while the concrete is still plastic. Concrete found adhering to the exposed surfaces of the rock shall be removed. Rock found in a loose shall be reset at the Contractor's expense by methods determined by the Engineer.

Gaps between the rocks shall be filled with dry applied mortar. Water shall be lightly applied to the mortared areas to ensure hydration. Excess mortar shall be removed from the face of the rock.

Wood headers will not be required at locations where rock blanket (Type 1) borders the edge of pavement.

Finished rock blanket (Type 1) surfacing shall be uniform and even as well as maintain original flow lines, slope gradients and contours of the project site.

MEASUREMENT AND PAYMENT

Rock blanket (Type 1) will be measured by the square meter as determined from actual measurements made parallel to the ground slope.

The contract price paid per square meter for rock blanket (Type 1) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing rock blanket, complete in place, including furnishing and installing or applying wood headers, metal stakes and soil sterilant, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.37 IRRIGATION CROSSOVERS

Irrigation crossovers shall conform to the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications and these special provisions.

Conduits shall be placed in open trenches in conformance with the provisions in Section 20-5.03B, "Conduit for Irrigation Crossovers," of the Standard Specifications.

Conduits shall be corrugated high density polyethylene (CHDPE) pipe. Corrugated high density polyethylene pipe shall conform to the requirements in ASTM Designation: F 405 or F 667, or AASHTO Designation: M 252 or M 294 and shall be Type S. Couplings and fittings shall be as recommended by the pipe manufacturer.

Water line crossovers shall conform to the provisions in Section 20-5.03C, "Water Line Crossovers," of the Standard Specifications.

Sprinkler control crossovers shall conform to the provisions in Section 20-5.027D, "Sprinkler Control Crossovers," of the Standard Specifications.

10-1.38 AGGREGATE BASE

Aggregate base shall be Class 2 and shall conform to the provisions in Section 26, "Aggregate Bases," of the Standard Specifications and these special provisions.

The restriction that the amount of reclaimed material included in Class 2 aggregate base not exceed 50 percent of the total volume of the aggregate used shall not apply. Aggregate for Class 2 aggregate base may include reclaimed glass. Aggregate base incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate base.

10-1.39 ASPHALT CONCRETE

Asphalt concrete shall be Type A and shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

The aggregate grading shall be 19-mm maximum.

The grade of asphalt binder to be mixed with aggregate for Type A asphalt concrete shall be PBA Grade 6a and shall conform to the provisions in "Asphalt" of these special provisions.

A prime coat and paint binder (Tack Coat) shall be applied and shall conform to the provisions in Section 33.4.02 of the Standard Specifications.

The amount of asphalt binder used in asphalt concrete placed in dikes, gutters, gutter flares, overside drains and aprons at the ends of drainage structures shall be increased one percent by mass of the aggregate over the amount of asphalt binder determined for use in asphalt concrete placed on the traveled way.

10-1.40 PILING

GENERAL

Piling shall conform to the provisions in Section 49, "Piling," of the Standard Specifications, and these special provisions.

Unless otherwise specified, welding of any work performed in conformance with the provisions in Section 49, "Piling," of the Standard Specifications, shall be in conformance with the requirements in AWS D1.1.

Foundation recommendations are included in the "Information Handout" available to the Contractor as provided for in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

Attention is directed to "Welding " of these special provisions.

Difficult pile installation is anticipated due to the presence of dense sand, fine gravel, and caving soils.

CAST-IN-DRILLED-HOLE CONCRETE PILES

Cast-in-drilled-hole concrete piling shall conform to the provisions in Section 49-4, "Cast-In-Place Concrete Piles," of the Standard Specifications and these special provisions.

The provisions of "Welding " of these special provisions shall not apply to temporary steel casings.

Cast-in-drilled-hole concrete piles 600 mm in diameter or larger may be constructed by excavation and depositing concrete under slurry.

Materials

Concrete deposited under slurry shall have a nominal penetration equal to or greater than 90 mm. Concrete shall be proportioned to prevent excessive bleed water and segregation.

Concrete deposited under slurry shall contain not less than 400 kg of cementitious material per cubic meter.

The combined aggregate grading used in concrete for cast-in-drilled-hole concrete piling shall be either the 25-mm maximum grading, the 12.5-mm maximum grading, or the 9.5-mm maximum grading and shall conform to the requirements in Section 90-3 "Aggregate Gradings," of the Standard Specifications.

Mineral Slurry

Mineral slurry shall be mixed and thoroughly hydrated in slurry tanks, and slurry shall be sampled from the slurry tanks and tested before placement in the drilled hole.

Slurry shall be recirculated or continuously agitated in the drilled hole to maintain the specified properties.

Recirculation shall include removal of drill cuttings from the slurry before discharging the slurry back into the drilled hole. When recirculation is used, the slurry shall be sampled and tested at least every 2 hours after beginning its use until tests show that the samples taken from the slurry tank and from near the bottom of the hole have consistent specified properties. Subsequently, slurry shall be sampled at least twice per shift as long as the specified properties remain consistent.

Slurry that is not recirculated in the drilled hole shall be sampled and tested at least every 2 hours after beginning its use. The slurry shall be sampled midheight and near the bottom of the hole. Slurry shall be recirculated when tests show that the samples taken from midheight and near the bottom of the hole do not have consistent specified properties.

Slurry shall also be sampled and tested prior to final cleaning of the bottom of the hole and again just prior to placing concrete. Samples shall be taken from midheight and near the bottom of the hole. Cleaning of the bottom of the hole and placement of the concrete shall not start until tests show that the samples taken from midheight and near the bottom of the hole have consistent specified properties.

Mineral slurry shall be tested for conformance to the requirements shown in the following table:

MINERAL SLURRY		
PROPERTY	REQUIREMENT	TEST
Density (kg/m ³) - before placement in the drilled hole - during drilling - prior to final cleaning - immediately prior to placing concrete	1030* to 1110* 1030* to 1200*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) bentonite attapulgite	 29 to 53 29 to 42	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8 to 10.5	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning - immediately prior to placing concrete	 less than or equal to 4.0	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 32 kg/m ³ . Slurry temperature shall be at least 4 degrees Celsius when tested.		

Any caked slurry on the sides or bottom of hole shall be removed before placing reinforcement. If concrete is not placed immediately after placing reinforcement, the reinforcement shall be removed and cleaned of slurry, the sides of the drilled hole cleaned of caked slurry, and the reinforcement again placed in the hole for concrete placement.

Synthetic Slurry

Synthetic slurries shall be used in conformance with the manufacturer's recommendations and these special provisions. The following synthetic slurries may be used:

PRODUCT	MANUFACTURER
SlurryPro CDP	KB Technologies Ltd. Suite 216 735 Broad Street Chattanooga, TN 37402 (800) 525-5237
Super Mud	PDS Company c/o Champion Equipment Company 8140 East Rosecrans Ave. Paramount, CA 90723 (562) 634-8180
Shore Pac GCV	CETCO Drilling Products Group 1350 West Shure Drive Arlington Heights, IL 60004 (847) 392-5800

Inclusion of a synthetic slurry on the above list may be obtained by meeting the Department's requirements for synthetic slurries. The requirements can be obtained from the Office of Structure Design, P.O. Box 942874, Sacramento, CA 94274-0001.

Synthetic slurries listed may not be appropriate for a given site.

Synthetic slurries shall not be used in holes drilled in primarily soft or very soft cohesive soils as determined by the Engineer.

A manufacturer's representative, as approved by the Engineer, shall provide technical assistance for the use of their product, shall be at the site prior to introduction of the synthetic slurry into a drilled hole, and shall remain at the site until released by the Engineer.

Synthetic slurries shall be sampled and tested at both mid-height and near the bottom of the drilled hole. Samples shall be taken and tested during drilling as necessary to verify the control of the properties of the slurry. Samples shall be taken and tested when drilling is complete, but prior to final cleaning of the bottom of the hole. When samples are in conformance with the requirements shown in the following tables for each slurry product, the bottom of the hole shall be cleaned and any loose or settled material removed. Samples shall be obtained and tested after final cleaning with steel reinforcement in place and just prior to placing concrete.

SlurryPro CDP synthetic slurries shall be tested for conformance to the requirements shown in the following table:

SLURRYPRO CDP KB Technologies Ltd.		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - during drilling - prior to final cleaning - just prior to placing concrete	less than or equal to 1075* less than or equal to 1025*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) - during drilling -prior to final cleaning - just prior to placing concrete	53 to 127 less than or equal to 74	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	6 to 11.5	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning - just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 32 kg/m^3 . Slurry temperature shall be at least 4 degrees Celsius when tested.		

Super Mud synthetic slurries shall be tested for conformance to the requirements shown in the following table:

SUPER MUD PDS Company		
PROPERTY	REQUIREMENT	TEST
Density (kg/m ³) - prior to final cleaning - just prior to placing concrete	less than or equal to 1025*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) - during drilling - prior to final cleaning - just prior to placing concrete	34 to 64 less than or equal to 64	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8 to 10.0	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning - just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 32 kg/m ³ . Slurry temperature shall be at least 4 degrees Celsius when tested.		

Shore Pac GCV synthetic slurries shall be tested for conformance to the requirements shown in the following table:

Shore Pac GCV CETCO Drilling Products Group		
PROPERTY	REQUIREMENT	TEST
Density (kg/m ³) - prior to final cleaning - just prior to placing concrete	less than or equal to 1025*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) - during drilling - prior to final cleaning - just prior to placing concrete	35 to 78 less than or equal to 60	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8.0 to 11.0	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
<p>*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 32 kg/m³.</p> <p>Slurry temperature shall be at least 4 degrees Celsius when tested.</p>		

Water Slurry

At the option of the Contractor water may be used as slurry when casing is used for the entire length of the drilled hole. Water slurry shall be tested for conformance to the requirements shown in the following table:

WATER SLURRY		
PROPERTY	REQUIREMENT	TEST
Density (kg/m ³) - prior to final cleaning - just prior to placing concrete	1017 *	Mud Weight (Density) API 13B-1 Section 1
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, salt water slurry may be used, and the allowable densities may be increased up to 32 kg/m ³ .		

Construction

The Contractor shall submit a placing plan to the Engineer for approval prior to producing the test batch for cast-in-drilled-hole concrete piling and at least 10 working days prior to constructing piling. The plan shall include complete description, details, and supporting calculations as listed below:

A. Requirements for all cast-in-drilled hole concrete piling:

1. Concrete mix design, certified test data, and trial batch reports.
2. Drilling or coring methods and equipment.
3. Proposed method for casing installation and removal when necessary.
4. Plan view drawing of pile showing reinforcement and inspection pipes, if required.
5. Methods for placing, positioning, and supporting bar reinforcement.
6. Methods and equipment for accurately determining the depth of concrete and actual and theoretical volume placed, including effects on volume of concrete when any casings are withdrawn.
7. Methods and equipment for verifying that the bottom of the drilled hole is clean prior to placing concrete.
8. Methods and equipment for preventing upward movement of reinforcement, including the Contractor's means of detecting and measuring upward movement during concrete placement operations.

B. Additional requirements when concrete is placed under slurry:

1. Concrete batching, delivery, and placing systems including time schedules and capacities therefor. Time schedules shall include the time required for each concrete placing operation at each pile.
2. Concrete placing rate calculations. When requested by the Engineer, calculations shall be based on the initial pump pressures or static head on the concrete and losses throughout the placing system, including anticipated head of slurry and concrete to be displaced.
3. Suppliers test reports on the physical and chemical properties of the slurry and any proposed slurry chemical additives including Material Safety Data Sheet.
4. Slurry testing equipment and procedures.
5. Removal and disposal of excavation, slurry, and contaminated concrete, including methods and rates of removal.
6. Slurry agitating, recirculating, and cleaning methods and equipment.

In addition to compressive strength requirements, the consistency of the concrete to be deposited under slurry shall be verified before use by producing a batch to be tested. The test batch shall be produced and delivered to the project under conditions and in time periods similar to those expected during the placement of concrete in the piles. Concrete for the test batch shall be placed in an excavated hole or suitable container of adequate size to allow testing in conformance with California Test 533. Depositing of test batch concrete under slurry will not be required. For piles where the time required for each concrete placing operation, as submitted in the placing plan, will be 2 hours or less, the test batch shall demonstrate that the proposed concrete mix design achieves both the specified nominal penetration and a penetration of at least 50 mm after twice that time has elapsed. For piles where the time required for each concrete placing operation, as submitted in the placing plan, will be more than 2 hours, the test batch shall demonstrate that the proposed concrete mix design achieves both the specified nominal penetration and a penetration of at least 50 mm after that time plus 2 hours has elapsed. The time period shall begin at the start of placement. The concrete shall not be vibrated or agitated during the test period. Upon completion of testing, the concrete shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Concrete deposited under slurry shall not be vibrated until all temporary casing is removed and concrete contaminated with soil, slurry, or other materials is removed. Concrete deposited under slurry shall be vibrated in the upper 2 m of the pile.

The concrete deposited under slurry shall be carefully placed in a compact, monolithic mass and by a method that will prevent washing of the concrete. Placing concrete shall be a continuous operation lasting not more than the time required for each concrete placing operation at each pile, as submitted in the placing plan, unless otherwise approved in writing by the Engineer. The concrete shall be placed with concrete pumps and delivery tube system of adequate number and size to complete the placing of concrete in the time specified. The delivery tube system shall consist of one of the following:

- A. A tremie tube or tubes, each of which are at least 250 mm in diameter, fed by one or more concrete pumps.
- B. One or more concrete pump tubes, each fed by a single concrete pump.

The delivery tube system shall consist of watertight tubes with sufficient rigidity to keep the ends always in the mass of concrete placed. If only one delivery tube is utilized to place the concrete, the tube shall be placed near the center of the drilled hole. Multiple tubes shall be uniformly spaced in the hole. Internal bracing for the steel reinforcing cage shall accommodate the delivery tube system. Tremies shall not be used for piles without space for a 250-mm tube.

Spillage of concrete into the slurry during concrete placing operations shall not be allowed. Delivery tubes shall be capped with a water tight cap, or plugged above the slurry level with a good quality, tight fitting, moving plug that will expel the slurry from the tube as the tube is charged with concrete. The cap or plug shall be designed to be released as the tube is charged. The pump discharge or tremie tube shall extend to the bottom of the hole before charging the tube with concrete. After charging the delivery tube system with concrete, the flow of concrete through a tube shall be induced by slightly raising the discharge end. During concrete placement, the tip of the delivery tube shall be maintained to prevent reentry of the slurry into the tube. Until at least 3 m of concrete has been placed, the tip of the delivery tube shall be within 150 mm of the bottom of the drilled hole, and then the embedment of the tip shall be maintained at least 3 m below the top surface of the concrete. Rapid raising or lowering of the delivery tube shall not be permitted. If the seal is lost or the delivery tube becomes plugged and must be removed, the tube shall be withdrawn, the tube cleaned, the tip of the tube capped to prevent entrance of the slurry, and the operation restarted by pushing the capped tube 3 m into the concrete and then reinitiating the flow of concrete.

When slurry is used, a fully operational standby concrete pump, adequate to complete the work in the time specified, shall be provided at the site during concrete placement. The slurry level shall be maintained within 300 mm of the top of the drilled hole.

A log of concrete placement for each drilled hole shall be maintained by the Contractor when concrete is deposited under slurry. The log shall show the pile location, tip elevation, dates of excavation and concrete placement, total quantity of concrete deposited, length and tip elevation of any casing, and details of any hole stabilization method and materials used. The log shall include a 215 mm x 280 mm sized graph of the concrete placed versus depth of hole filled. The graph shall be plotted continuously throughout placing of concrete. The depth of drilled hole filled shall be plotted vertically with the pile tip oriented at the bottom and the quantity of concrete shall be plotted horizontally. Readings shall be made at least at each 1.5 m of pile depth, and the time of the reading shall be indicated. The graph shall be labeled with the pile location, tip elevation, cutoff elevation, and the dates of excavation and concrete placement. The log shall be delivered to the Engineer within one working day of completion of placing concrete in the pile.

After placing reinforcement and prior to placing concrete in the drilled hole, if drill cuttings settle out of slurry, the bottom of the drilled hole shall be cleaned. The Contractor shall verify that the bottom of the drilled hole is clean.

If temporary casing is used, concrete placed under slurry shall be maintained at a level at least 1.5 m above the bottom of the casing. The withdrawal of casings shall not cause contamination of the concrete with slurry.

Acceptance Testing and Mitigation

Vertical inspection pipes for acceptance testing shall be provided in all cast-in-drilled-hole concrete piles that are 600 mm in diameter or larger, except when the holes are dry or when the holes are dewatered without the use of temporary casing to control the groundwater.

Inspection pipes shall be Schedule 40 polyvinyl chloride pipe with a nominal inside diameter of 50 mm. Each inspection pipe shall be capped top and bottom and shall have watertight couplers to provide a clean, dry and unobstructed 50-mm diameter clear opening from 1.0 m above the pile cutoff down to the bottom of the reinforcing cage.

If the Contractor drills the hole below the specified tip elevation, the reinforcement and the inspection pipes shall be extended to 75 mm clear of the bottom of the drilled hole.

Inspection pipes shall be placed around the pile, inside the outermost spiral or hoop reinforcement, and 75 mm clear of the vertical reinforcement, at a uniform spacing not exceeding 840 mm measured along the circle passing through the centers of inspection pipes. A minimum of 2 inspection pipes per pile shall be used. When the vertical reinforcement is not bundled and each bar is not more than 26 mm in diameter, inspection pipes may be placed 50 mm clear of the vertical reinforcement. The inspection pipes shall be placed to provide the maximum diameter circle that passes through the centers of the inspection pipes while maintaining the clear spacing required herein. The pipes shall be installed in straight alignment, parallel to the main reinforcement, and securely fastened in place to prevent misalignment during installation of the reinforcement and placing of concrete in the hole.

The Contractor shall log the location of the inspection pipe couplers with respect to the plane of pile cut off, and these logs shall be delivered to the Engineer upon completion of the placement of concrete in the drilled hole.

After placing concrete and before requesting acceptance tests, each inspection pipe shall be tested by the Contractor in the presence of the Engineer by passing a 48.3-mm diameter rigid cylinder 610 mm long through the complete length of pipe. If the 48.3-mm diameter rigid cylinder fails to pass any of the inspection pipes, the Contractor shall attempt to pass a 32.0-mm diameter rigid cylinder 1.375 m long through the complete length of those pipes in the presence of the Engineer. If an inspection pipe fails to pass the 32.0-mm diameter cylinder, the Contractor shall immediately fill all inspection pipes in the pile with water.

The Contractor shall replace each inspection pipe that does not pass the 32.0-mm diameter cylinder with a 50.8-mm diameter hole cored through the concrete for the entire length of the pile. Cored holes shall be located as close as possible to the inspection pipes they are replacing, no more than 150 mm inside the reinforcement, and coring shall not damage the pile reinforcement. Cored holes shall be made with a double wall core barrel system utilizing a split tube type inner barrel. Coring with a solid type inner barrel will not be allowed. Coring methods and equipment shall provide intact cores for the entire length of the pile concrete. The coring operation shall be logged by an Engineering Geologist or Civil Engineer licensed in the State of California and experienced in core logging. Coring logs shall include complete descriptions of inclusions and voids encountered during coring, and shall be delivered to the Engineer upon completion. Concrete cores shall be preserved, identified with the exact location the core was recovered from within the pile, and made available for inspection by the Engineer.

Acceptance tests of the concrete will be made by the Engineer, without cost to the Contractor. Acceptance tests will evaluate the homogeneity of the placed concrete. Tests will include gamma-gamma logging. Tests may also include crosshole sonic logging and other means of inspection selected by the Engineer. The Contractor shall not conduct operations within 8.0 m of the gamma-gamma logging operations. The Contractor shall separate reinforcing steel as necessary to allow the Engineer access to the inspection pipes to perform gamma-gamma logging or other acceptance testing. After requesting acceptance tests and providing access to the piling, the Contractor shall allow 3 weeks for the Engineer to conduct these tests and make determination of acceptance if the 48.3-mm diameter cylinder passed all inspection pipes, and 4 weeks if only the 32.0-mm diameter cylinder passed all inspection pipes. Should the Engineer fail to complete these tests within the time allowance, and if in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in inspection, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

All inspection pipes and cored holes in a pile shall be dewatered and filled with grout after notification by the Engineer that the pile is acceptable. Placement and removal of water in the inspection pipes shall be at the Contractors expense. Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. The inspection pipes and holes shall be filled using grout tubes that extend to the bottom of the pipe or hole or into the grout already placed.

If acceptance testing performed by the Engineer determines that a pile does not meet the requirements of the specifications, then that pile will be rejected and all depositing of concrete under slurry or concrete placed using temporary casing for the purpose of controlling groundwater shall be suspended until written changes to the methods of pile construction are approved in writing by the Engineer.

The Contractor shall submit to the Engineer for approval a mitigation plan for repair, supplementation, or replacement for each rejected cast-in-drilled-hole concrete pile, and this plan shall conform to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. Prior to submitting this mitigation plan, the Engineer will hold a repair feasibility meeting with the Contractor to discuss the feasibility of repairing rejected piling. The Engineer will consider the size of the defect, the location of the defect, and the design information and corrosion protection considerations for the pile. This information will be made available to the Contractor, if appropriate, for the development of the mitigation plan. If the Engineer determines that it is not feasible to repair the rejected pile, the Contractor shall not include repair as a means of mitigation and shall proceed with the submittal of a mitigation plan for replacement or supplementation of the rejected pile.

If the Engineer determines that a rejected pile does not require mitigation due to structural, geotechnical, or corrosion concerns, the Contractor may elect to 1) repair the pile per the approved mitigation plan, or 2) not repair anomalies found during acceptance testing of that pile. For such unrepaired piles, the Contractor shall pay to the State, \$400 per cubic meter for the portion of the pile affected by the anomalies. The volume, in cubic meters, of the portion of the pile affected by the anomalies, shall be calculated as the area of the cross-section of the pile affected by each anomaly, in square meters, as determined by the Engineer, multiplied by the distance, in meters, from the top of each anomaly to the specified tip of the pile. If the volume calculated for one anomaly overlaps the volume calculated for additional anomalies within the pile, the calculated volume for the overlap shall only be counted once. In no case shall the amount of the payment to the State for any such pile be less than \$400. The Department may deduct the amount from any moneys due, or that may become due the Contractor under the contract.

Pile mitigation plans shall include the following:

- A. The designation and location of the pile addressed by the mitigation plan.
- B. A review of the structural, geotechnical, and corrosion design requirements of the rejected pile.
- C. A step by step description of the mitigation work to be performed, including drawings if necessary.
- D. An assessment of how the proposed mitigation work will address the structural, geotechnical, and corrosion design requirements of the rejected pile.
- E. Methods for preservation or restoration of existing earthen materials.
- F. A list of affected facilities, if any, with methods and equipment for protection of these facilities during mitigation.
- G. The State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Kilometer Post, and the Contractor's (and Subcontractor's if applicable) name on each sheet.
- H. A list of materials, with quantity estimates, and personnel, with qualifications, to be used to perform the mitigation work.
- I. The seal and signature of an engineer who is licensed as a Civil Engineer by the State of California.

For rejected piles to be repaired, the Contractor shall submit a pile mitigation plan that contains the following additional information:

- A. An assessment of the nature and size of the anomalies in the rejected pile.
- B. Provisions for access for additional pile testing if required by the Engineer.

For rejected piles to be replaced or supplemented, the Contractor shall submit a pile mitigation plan that contains the following additional information:

- A. The proposed location and size of additional piling.
- B. Structural details and calculations for any modification to the structure to accommodate the replacement or supplemental piling.

All provisions for cast-in-drilled-hole concrete piling shall apply to replacement piling.

The Contractor shall allow the Engineer 3 weeks to review the mitigation plan after a complete submittal has been received.

Should the Engineer fail to review the complete pile mitigation submittal within the time specified, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the pile mitigation plan, an extension of time commensurate with the delay in completion of the work thus caused will be granted in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

When repairs are performed, the Contractor shall submit a mitigation report to the Engineer within 10 days of completion of the repair. This report shall state exactly what repair work was performed and quantify the success of the repairs relative to the submitted mitigation plan. The mitigation report shall be stamped and signed by an engineer that is licensed as a Civil Engineer by the State of California. The mitigation report shall show the State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Kilometer Post, and the Contractor (and Subcontractor if applicable) name on each sheet. The Engineer will be the sole judge as to whether a mitigation proposal is acceptable, the mitigation efforts are successful, and to whether additional repairs, removal and replacement, or construction of a supplemental foundation is required.

MEASUREMENT AND PAYMENT (PILING)

Measurement and payment for the various types and classes of piles shall conform to the provisions in Sections 49-6.01, "Measurement," and 49-6.02, "Payment," of the Standard Specifications and these special provisions.

Payment for cast-in-place concrete piling shall conform to the provisions in Section 49-6.02, "Payment," of the Standard Specifications except that, when the diameter of cast-in-place concrete piling is shown on the plans as 600 mm or larger, reinforcement in the piling will be paid for by the kilogram as bar reinforcing steel (bridge).

Full compensation for furnishing and placing additional testing reinforcement, for load test anchorages, and for cutting off test piles as specified, shall be considered as included in the contract price paid for piling of the type or class shown in the Engineer's Estimate, and no additional compensation will be allowed.

No additional compensation or extension of time will be made for additional foundation investigation, installation and testing of indicator piling, cutting off piling and restoring the foundation investigation and indicator pile sites, and review of request by the Engineer.

Full compensation for slurry, depositing concrete under slurry, test batches, inspection pipes, filling inspection holes and pipes with grout, drilling oversized cast-in-drilled-hole concrete piling, filling cave-ins and oversized piles with concrete, and redrilling through concrete, shall be considered as included in the contract prices paid per meter for cast-in-drilled-hole concrete piling of the types and sizes listed in the Engineer's Estimate, and no additional compensation will be allowed therefor.

10-1.41 PRESTRESSING CONCRETE

Prestressing concrete shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

The details shown on the plans for cast-in-place prestressed box girder bridges are based on a bonded full length draped tendon prestressing system. For these bridges the Contractor may, in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications, propose an alternative prestressing system utilizing bonded partial length tendons provided the proposed system and associated details meet the following requirements:

- A. The proposed system and details shall provide moment and shear resistances at least equal to those used for the design of the structure shown on the plans.
- B. The concrete strength shall not be less than that shown on the plans.
- C. Not less than 35 percent of the total prestressing force at any section shall be provided by full length draped tendons.
- D. Anchorage blocks for partial length tendons shall be located so that the blocks will not interfere with the placement of the utility facilities shown on the plans or of any future utilities to be placed through openings shown on the plans.
- E. Temporary prestressing tendons, if used, shall be detensioned, and the temporary ducts shall be filled with grout before completion of the work. Temporary tendons shall be either removed or fully encased in grout before completion of the work.
- F. All details of the proposed system, including supporting checked calculations, shall be included in the drawings submitted in conformance with the provisions in Section 50-1.02, "Drawings," of the Standard Specifications.

Moments and shears for loads used in the design shown on the plans will be made available to the Contractor upon written request to the Engineer.

10-1.42 TIEBACK ANCHORS

Anchors at the tieback portion of retaining wall 189, consisting of holes drilled in foundation material, grouted steel bars or strands, and anchorage assemblies, and testing of installed anchors, shall conform to the details shown on the plans, the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

Foundation recommendations are included in the "Information Handout" available to the Contractor in conformance with the provisions in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

The Contractor shall determine the bond length necessary to meet acceptance criteria specified herein.

The submittal of reduced prints of corrected original tracings will not be required for tieback anchor installations.

In fabricating, handling, shipping, and placing tieback anchors, adequate care shall be taken to avoid damage to the sheathing. All damage to the sheathing caused by handling and fabrication prior to tieback anchor installation shall be repaired or replaced as determined by the Engineer. Repair procedure for the sheathing shall be included in the working drawings.

MATERIALS

Whenever "member" is referred to in Section 50, "Prestressing Concrete," of the Standard Specifications, it shall be considered to mean tieback anchor.

Structural steel for the tieback retaining wall shall conform to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions. Structural steel shall consist of the anchorage assembly. The anchorage assembly shall be galvanized as indicated on the plans. The provisions of "Welding Quality Control" of these special provisions shall not apply to the weld between the steel tube and the bearing plate of the anchorage assembly for tiebacks. Those provisions shall apply to all other welds of structural steel for tieback retaining walls.

The permanent bearing plate of the tieback anchor shall effectively distribute the design force (T), to the concrete, such that the concrete bearing stress does not exceed 11 MPa and the bending stress does not exceed $0.55 f_y$ for steel nor $0.36 f_y$ for cast steel or cast iron.

Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. Fine aggregate may be added to the grout mixture of portland cement and water used outside of the grouted sheathing in drilled holes which are 200 mm or greater in diameter, but only to the extent that the cement content of the grout is not less than 500 kg per cubic meter of grout. Fine aggregate, if used, shall conform to the provisions in Section 90-2, "Materials," and Section 90-3, "Aggregate Gradings," of the Standard Specifications.

The plastic sheathing for tieback anchors shall conform to the following: polyvinyl chloride (PVC) sheathing, high density polyethylene (HDPE) sheathing, and polypropylene sheathing.

Corrugated plastic sheathing shall be PVC or HDPE. The width of corrugations, the distance between corrugations, and the height of corrugations of corrugated plastic sheathing shall be approximately the same.

PVC sheathing may be used for smooth sheathing for bar tendons and corrugated sheathing. PVC sheathing shall conform to ASTM Designation: D 1784, Class 13464-B. Corrugated PVC sheathing shall have a nominal wall thickness of 1.0 mm. HDPE sheathing may be used for smooth sheathing for bar tendons and corrugated sheathing. HDPE sheathing shall have a density between 940 kg/m^3 and 960 kg/m^3 as measured in accordance with ASTM Designation: D 792, A-2. Corrugated HDPE sheathing shall have a nominal wall thickness of 1.5 mm for sheathing with an outside diameter of 75 mm or greater, and a nominal thickness of 1.0 mm for sheathing with an outside diameter less than 75 mm, with a tolerance of minus 0.25-mm.

HDPE sheathing may be used for the smooth sheathing encapsulating individual strands of strand type tendons. Smooth HDPE sheathing for encapsulating strands shall have a minimum wall thickness of 1.0 mm. Polypropylene sheathing may be used for the smooth plastic sheathing encapsulating individual strands of strand type tendons. Polypropylene sheathing shall have a density between 900 kg/m^3 and 910 kg/m^3 . Smooth polypropylene sheathing shall have a minimum wall thickness of 1.0 mm.

The smooth sheathing for the unbonded length of the individual strands shall have sufficient strength to prevent damage during construction operations, shall be watertight, chemically stable without embrittlement or softening, and nonreactive with concrete, steel or corrosion inhibiting grease. Smooth plastic sheathing, including joints, shall be watertight.

The corrugated sheathing, including joints, shall have sufficient strength to prevent damage during construction operations, shall be grout-tight and watertight, chemically stable without embrittlement or softening, and nonreactive with concrete, steel or corrosion inhibiting grease.

The transition between the corrugated plastic sheathing and the anchorage assembly shall be an approved detail that allows stressing to the design force without evidence of distress in the corrugated plastic sheathing.

Additional requirements for tiebacks with strand type tendons are as follows:

- A. The individual strands of a tendon, except for the bonded length, shall be fully coated with corrosion inhibiting grease and then encapsulated by a smooth HDPE or polypropylene sheath. The corrosion inhibiting grease shall fill all space between strand wires and shall encapsulate the strand giving an encasement diameter at least 0.12-mm greater than the diameter of the bare strand. The sheath shall be hot melt extruded onto the strand or shall be shop applied by an approved method that assures that all spaces between the sheath and the strand and between the strand wires are filled with corrosion inhibiting grease.

- B. The corrosion inhibiting grease shall provide a continuous nonbrittle film of corrosion protection to the prestressing steel and lubrication between the strand and the sheathing, shall resist flow from the sheathing, shall be chemically stable and nonreactive with the prestressing steel, sheathing material and concrete, and shall be organic with appropriate polar, moisture displacing, and corrosion inhibiting additives.
- C. The corrosion inhibiting grease shall have the physical properties listed in Table 3.2.1 of the Post Tensioning Manual, Fourth Edition, by the Post Tensioning Institute and as modified below. At least 40 days before use, a sample from the lot to be used and test results shall be provided for the corrosion inhibiting grease.

Test	Requirements	ASTM Designation:
Water Soluble Ions: Nitrates	10 g/kg max.	D 3867
Corrosion Test: 5% Salt Fog @ 38° C. 125 µm coating on 76 mm x 152 mm Q panel Type S, 1000 hrs min.	Grade 7 or better	B 117, D 610
Compatibility with sheathing: Hardness change & volume change of polymer after exposure to grease 40 days at 66° C.	15% max. 10% max.	D 4289, Except use D 792 for density

CONSTRUCTION

Tieback anchors shall be installed in accordance with the manufacturer's recommendations. In case of a conflict between the manufacturer's recommendations and these special provisions, these special provisions shall prevail.

Water and grout from tieback anchor construction operations shall not be permitted to fall on public traffic, to flow across shoulders or lanes occupied by public traffic, or to flow into landscaping, gutters or other drainage facilities. Excessive amounts of water shall not be used in any of the drilling and the tieback anchor installation procedures.

Tieback anchor steel shall be protected prior to completion of all grouting against rust, corrosion and physical damage in conformance with the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications. In addition, there shall be no evidence of distress in the plastic sheathing or crushing of the cement grout within the pregouted sheathing.

The tieback anchorage assembly shall be protected against rust, corrosion and physical damage, prior to completion of all grouting of enclosure or encasement in concrete.

The tieback anchor installation method selected by the Contractor shall be sufficient to achieve the loadings specified herein. Holes for tieback anchors shall be drilled in the foundation to a depth sufficient to provide the necessary bond length beyond the minimum unbonded length shown on the plans.

Tieback anchorage holes shall be drilled by either the rotary or rotary percussion drilling method.

The top level of tiebacks shall be installed in drilled holes advanced with drill casing. Drill casing shall be removed while filled with grout as the initial grout is being placed.

The diameter of the drilled hole shall be large enough to provide a minimum of 25 mm grout cover within the bonded length of the tendon. Centralizers shall be used within the bonded length of the tendon.

Pregrouting shall occur at least 48 hours before placing the tendon in the drilled hole.

Prior to installing each anchor assembly into the drilled hole, the anchor assembly shall be clean and free of oil, grease or other extraneous substances, and any damage to the sheathing shall be repaired or replaced.

Grout for all stages of tieback construction shall be injected at the low end of the void being filled and shall be expelled at the high end until there is no evidence of entrapped air, water or diluted grout. The grout shall be placed using grout tubes, unless another method is approved by the Engineer. The quantity of the grout and the grout pressures shall be recorded.

After placing initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.

Additional requirements for tiebacks with bar type tendons are as follows:

- A. The bar tendons in the unbonded area shall be sheathed with smooth sheathing that extends into the steel tube of the permanent tieback anchorage assembly, as shown on the plans. For this portion of smooth sheathing there is no minimum wall thickness and the sheathing shall be either PVC or HDPE.
- B. In addition, bar tendons shall be sheathed full-length with corrugated sheathing. The annular space between the bar and the corrugated sheathing shall be pregrouted prior to placing the tendons in the drilled hole. The bar shall be centered in the sheathing.
- C. There shall be a seal between the smooth sheathing and the corrugated sheathing at the top and bottom of the length of smooth sheathing.
- D. For bar tendons, the initial grout in the drilled hole may be placed before or after insertion of the bar tendon.
- E. For drilled holes 150 mm in diameter or less, the initial grout outside of the corrugated sheathing shall extend to within 150 mm of the end of the steel tube of the anchorage assembly. Grout in the unbonded length shall not be placed under pressure. For drilled holes greater than 150 mm in diameter, the initial grout outside of the corrugated sheathing shall be within the limits of the bonded length. After placing the initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.

Additional requirements for tiebacks with strand type tendons are as follows:

- A. The Contractor shall have the option of using Alternative A or Alternative B as shown on the plans for tieback tendons.
- B. For Alternative A and Alternative B, strand tendons shall be sheathed with corrugated sheathing. The individual strands within the bonded length shall be separated by spaces so that the entire surface of each strand is bonded in the grout. The maximum spacing of strand spacers shall be 1.50 m. The strand spacers shall be plastic and of a construction and strength that will provide support for the individual strands during construction operations.
- C. For Alternative A, the bonded length of the tendon is sheathed with corrugated sheathing and pregrouted full length of the corrugated sheathing before placing the tendon in the hole. The corrugated sheathing shall lap the smooth sheathing on the strands 600 mm. For this alternative, the initial grout in the drilled hole may be placed before or after insertion of the strand tendon.
- D. For Alternative B, the tendon is sheathed full length with corrugated sheathing and pregrouted a minimum length of 600 mm before placing the tendon in the hole. After placing the tendon into the drilled hole and before placing initial grout in the drilled hole, the grout shall be injected at the low end of the corrugated sheathing and the grout shall be expelled at the high end until there is no evidence of entrapped air, water or diluted grout.
- E. For Alternative A and Alternative B, anchors in holes of 150 mm diameter and smaller shall be initially grouted to within 150 mm of the end of the steel tube. Grout in the unbonded length shall not be placed under pressure. After placing the initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.
- F. For Alternative A and Alternative B, anchors in holes of greater than 150 mm diameter shall be initially grouted within the bond length. After placing the initial grout, the anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during testing operations.

Testing

All tiebacks shall be load tested by either a performance test or a proof test. Load testing shall be performed against the bearing pads. Bearing pads shall be kept a minimum of 300 mm away from the edges of the drilled hole. The magnitude of applied test loads shall be determined with a calibrated pressure gauge or a load cell. Movements of the end of the tieback, relative to an independent fixed reference point, shall be measured and recorded to the nearest 0.025 mm at each load increment during the load tests. The Contractor shall perform the measuring and recording and shall furnish the Engineer copies of the recorded movements.

A minimum of 4 tiebacks shall be performance tested. The Engineer shall determine the location of the tiebacks to be performance tested.

The performance test or proof test shall be conducted by measuring the test load applied to the tieback and the tieback end movement during incremental loading and unloading of the anchor in accordance with the loading schedule. The test load shall be held constant for 10 minutes. During the test load hold, the movement of the end of the tendon shall be measured at 1, 2, 3, 4, 5, 6, and 10 minutes. If the total movement between one minute and 10 minutes exceeds one mm, the test load shall be held for an additional 50 minutes. Total movement shall be measured at 15, 20, 25, 30, 45, and 60 minutes. If the test load is held for 60 minutes, a creep curve showing the creep movement between one minute and 60 minutes shall be plotted as a function of the logarithm of time.

LOADING SCHEDULES		
PERFORMANCE TEST		PROOF TEST
	(CONT'D)	
AL	AL	AL
0.25T	0.25T	0.25T
AL	0.50T	0.50T
0.25T	0.75T	0.75T
0.50T	1.00T	1.00T
AL	1.25T	1.25T
0.25T	AL	1.50T (TEST LOAD)
0.50T	0.25T	AL
0.75T	0.50T	
AL	0.75T	
0.25T	1.00T	
0.50T	1.25T	
0.75T	1.50T (TEST LOAD)	
1.00T (CONT'D)	AL	
T = Design force for the anchor shown on the plans		
AL = Alignment load		

For performance and proof tests, each increment of load shall be applied in less than one minute and held for at least one minute but not more than 2 minutes or as specified above. The observation period for the load hold shall start when the pump begins to apply the last increment of load.

The jacking equipment, including the tendon movement measuring system, shall be stable during all phases of the tieback loading operations.

All tiebacks not performance tested shall be proof tested. If 1.5 times the design force cannot be obtained, the tieback shall be redesigned and replaced. Tieback anchors shall not be retested, unless the tieback bond length is post-grouted after the unacceptable test.

A performance tested tieback is acceptable if:

- A. The measured elastic movement exceeds 0.80 of the theoretical elongation of the unbonded length plus the jacking length at the maximum test load; and
- B. The creep movement between one and 10 minutes is less than 1.0 mm.

A proof tested tieback is acceptable if:

- A. The pattern of movements is similar to that of adjacent performance tested tiebacks; and
- B. The creep movement between one and 10 minutes is less than 1.0 mm.

Performance tested or proof tested tiebacks which fail to meet acceptance criterion B will be acceptable if the maximum load is held for 60 minutes and the creep curve plotted from the movement data indicates a creep rate of less than 2.0 mm for the last log cycle of time.

Lock-off

After successful testing of the tiebacks, the tiebacks shall be tensioned against the structure and locked off at a load equal to 0.75 T. The lock-off force is the load on the jacks which is maintained while the anchor head or anchor nuts on the tieback are permanently set. Immediately after lock-off, a lift-off test shall be performed to demonstrate that the specified lock-off force was obtained. Adjustments in the shim thickness shall be made if required to maintain the specified lock-off force.

For strand tendons, the permanent wedges shall be fully set in the anchor head while the tendon is stressed to the test load of 1.50 T, and then locked off at the lock-off force by removal of the shims or other appropriate means.

Grouting to the level of secondary grouting to the dimensions shown on the plans shall be completed only after successful testing and lock-off has been completed. At least 24 hours after the secondary grout has set, the remaining void in the steel tube and bearing plate shall be filled with grout. Grout shall be injected at the low end and expelled at the high end until there is no evidence of entrapped air or water. A minimum grout head of 600 mm shall be maintained until the grout has set.

MEASUREMENT AND PAYMENT

No payment will be made for tiebacks which do not pass the specified testing requirements.

Tieback anchors will be measured and paid for by the unit, and the number for payment will be determined by the requirements of the details shown on the plans. The contract unit price paid for tieback anchor shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the tieback anchors, including special measures taken to contain grout in the drilled hole, testing, and furnishing and installing anchorage assemblies, complete in place, including repair or replacement of sheathing as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.43 CONCRETE STRUCTURES

Portland cement concrete structures shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

GENERAL

Shotcrete shall not be used as an alternative construction method for reinforced concrete members unless otherwise specified.

Neoprene strip shall be furnished and installed at abutment backwall joint protection in conformance with the details shown on the plans, the provisions in the Standard Specifications, and these special provisions.

Furnishing and installing neoprene strip shall conform to the requirements for strip waterstops as provided in Section 51-1.145, "Strip Waterstops," of the Standard Specifications, except that the protective board will not be required.

FALSEWORK

Falsework shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Temporary crash cushion modules, as shown on the plans and conforming to the provisions in "Temporary Crash Cushion Module" of these special provisions, shall be installed at the approach end of temporary railings which are located less than 4.6 m from the edge of a traffic lane. For 2-way traffic openings, temporary crash cushion modules shall be installed at the departing end of temporary railings which are located less than 1.8 m from the edge of a traffic lane.

Welding and Nondestructive Testing

Welding of steel members, except for previously welded splices and except for when fillet welds are used where load demands are less than or equal to 175 N/mm for each 3 mm of fillet weld, shall conform to AWS D1.1 or other recognized welding standard. The welding standard to be utilized shall be specified by the Contractor on the working drawings. Previously welded splices for falsework members are defined as splices made prior to the member being shipped to the project site.

Splices made by field welding of steel beams at the project site shall undergo nondestructive testing (NDT). At the option of the Contractor, either ultrasonic testing (UT) or radiographic testing (RT) shall be used as the method of NDT for each field weld and any repair made to a previously welded splice in a steel beam. Testing shall be performed at locations selected by the Contractor. The length of a splice weld where NDT is to be performed, shall be a cumulative weld length equal to 25 percent of the original splice weld length. The cover pass shall be ground smooth at the locations to be tested. The acceptance criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional NDT shall be performed on the repaired sections. The NDT method chosen shall be used for an entire splice evaluation including any required repairs.

For all field welded splices, the Contractor shall furnish to the Engineer a letter of certification which certifies that all welding and NDT, including visual inspection, are in conformance with the specifications and the welding standard shown on the approved working drawings. This letter of certification shall be signed by an engineer who is registered as a Civil Engineer in the State of California and shall be provided prior to placing any concrete for which the falsework is being erected to support.

For previously welded splices, the Contractor shall determine and perform all necessary testing and inspection required to certify the ability of the falsework members to sustain the stresses required by the falsework design. This welding certification shall be in writing, shall be signed by an engineer who is registered as a Civil Engineer in the State of California, and shall be provided prior to placing any concrete for which the falsework is being erected to support.

The Contractor's engineer who signs the falsework drawings shall also certify in writing that the falsework is constructed in conformance with the approved drawings and the contract specifications prior to placing concrete. This certification shall include performing any testing necessary to verify the ability of the falsework members to sustain the stresses required by the falsework design. The engineer who signs the drawings may designate a representative to perform this certification. Where falsework contains openings for railroads, vehicular traffic, or pedestrians, the designated representative shall be qualified to perform this work, shall have at least three years of combined experience in falsework design or supervising falsework construction, and shall be registered as a Civil Engineer in the State of California. For other falsework, the designated representative shall be qualified to perform this work and shall have at least three years of combined experience in falsework design or supervising falsework construction. The Contractor shall certify the experience of the designated representative in writing and provide supporting documentation demonstrating the required experience if requested by the Engineer.

COST REDUCTION INCENTIVE PROPOSALS FOR CAST-IN-PLACE PRESTRESSED BOX GIRDER BRIDGES

Except as provided herein, cast-in-place prestressed box girder bridges shall be constructed in conformance with the details shown on the plans and the provisions in Section 50, "Prestressing Concrete," and Section 51, "Concrete Structures," of the Standard Specifications.

If the Contractor submits cost reduction incentive proposals for cast-in-place prestressed box girder bridges, the proposals shall be in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications and these special provisions.

The Engineer may reject any proposal which, in the Engineer's judgment, may not produce a structure which is at least equivalent to the planned structure.

At the time the cost reduction incentive proposal (CRIP) is submitted to the Engineer, the Contractor shall also submit 4 sets of the proposed revisions to the contract plans, design calculations, and calculations from an independent checker for all changes involved in the proposal, including revisions in camber, predicted deck profile at each construction stage, and falsework requirements to the Office of Structure Design, Documents Unit, P.O. Box 942874, Sacramento, CA 94274-0001 (1801 30th Street, Sacramento, CA 95816), telephone (916) 227-8230. When notified in writing by the Engineer, the Contractor shall submit 12 sets of the CRIP plan revisions and calculations to the Office of Structure Design for final approval and use during construction. The calculations shall verify that all requirements are satisfied. The CRIP plans and calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California.

The CRIP plans shall be either 279 mm x 432 mm, or 559 mm x 864 mm in size. Each CRIP plan sheet and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer Post. Each CRIP plan sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

Within 3 weeks after final approval of the CRIP plan sheets, one set of the corrected good quality prints on 75-g/m² (minimum) bond paper, 559 mm x 864 mm in size, of all CRIP plan sheets prepared by the Contractor for each CRIP shall be furnished to the Office of Structure Design, Documents Unit.

Each CRIP shall be submitted prior to completion of 25 percent of the contract working days and sufficiently in advance of the start of the work that is proposed to be revised by the CRIP to allow time for review by the Engineer and correction by the Contractor of the CRIP plans and calculations without delaying the work. The Contractor shall allow a minimum of 3 weeks for the review of a CRIP. In the event that several CRIPs are submitted simultaneously, or an additional CRIP is submitted for review before the review of a previously submitted CRIP has been completed, the Contractor shall designate the sequence in which the CRIPs are to be reviewed. In this event, the time to be provided for the review of any proposal in the sequence shall be not less than the review time specified herein for that proposal, plus 2 weeks for each CRIP of higher priority which is still under review.

Should the review not be complete by the date specified in the Contractor's CRIP, or such other date as the Engineer and Contractor may subsequently have agreed to in writing and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in review of CRIP plans and calculations, an extension of time commensurate with the delay in completion of the work thus caused will be granted as provided in Section 8-1.07, "Liquidated Damages," of the Standard Specifications except that the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications shall not apply.

Permits and approvals required of the State have been obtained for the structures shown on the plans. Proposals which result in a deviation in configuration may require new permits or approvals. The Contractor shall be responsible for obtaining the new permits and approvals before the Engineer will reach a decision on the proposal. Delays in obtaining permits and approvals will not be reason for granting an extension of contract time.

All proposed modifications shall be designed in conformance with the bridge design specifications and procedures currently employed by the Department. The proposal shall include all related, dependent or incidental changes to the structure and other work affected by the proposal. The proposal will be considered only when all aspects of the design changes are included for the entire structure. Changes, such as but not limited to, additional reinforcement and changes in location of reinforcement, necessary to implement the CRIP after approval by the Engineer, shall be made at the Contractor's expense.

Modifications may be proposed in (1) the thickness of girder stems and deck slabs, (2) the number of girders, (3) the deck overhang dimensions as specified herein, (4) the amount and location of reinforcing steel, (5) the amount and location of prestressing force in the superstructure, and (6) the number of hinges, except that the number of hinges shall not be increased. The strength of the concrete used may be increased but the strength employed for design or analysis shall not exceed 42 MPa.

Modifications proposed to the minimum amount of prestressing force which must be provided by full length draped tendons are subject to the provisions in "Prestressing Concrete" of these special provisions.

No modifications will be permitted in (1) the foundation type, (2) the span lengths or (3) the exterior dimensions of columns or bridge superstructure, except that the overhang dimension from face of exterior girder to the outside edge of roadway deck may be uniformly increased or decreased by 25 percent on each side of the box girder section. Fixed connections at the tops and bottoms of columns shown on the plans shall not be eliminated.

The Contractor shall be responsible for determining construction camber and obtaining the final profile grade as shown on the plans.

The Contractor shall reimburse the State for the actual cost of investigating CRIPs for cast-in-place prestressed box girder bridges submitted by the Contractor. The Department will deduct this cost from any moneys due, or that may become due the Contractor under the contract, regardless of whether or not the proposal is approved or rejected.

DECK CLOSURE POURS

Where a deck closure pour is shown on the plans, reinforcement protruding into the closure space and forms for the closure pour shall conform to the following:

- A. During the time of placement of concrete in the deck, other than for the closure pour itself, reinforcing steel which protrudes into the closure space shall be completely free from any connection to the reinforcing steel, concrete, or other attachments of the adjacent structure, including forms. The reinforcing steel shall remain free of any connection for a period of not less than 24 hours following completion of the pour.
- B. Forms for the closure pour shall be supported from the superstructure on both sides of the closure space.

SLIDING BEARINGS

Sliding bearings consisting of elastomeric bearing pads lubricated with grease and covered with sheet metal shall conform to the following requirements:

- A. Grease shall conform to the requirements of Military Specification: MIL-S-8660. A uniform film of grease shall be applied to the upper surface of the pads prior to placing the sheet metal.
- B. Sheet metal shall be commercial quality galvanized sheet steel. The sheet metal shall be smooth and free of kinks, bends, or burrs.
- C. Construction methods and procedures shall prevent grout or concrete seepage into the sliding bearing assembly.

ELASTOMERIC BEARING PADS

Elastomeric bearing pads shall conform to the provisions in Section 51-1.12H, "Elastomeric Bearing Pads," of the Standard Specifications and these special provisions.

DECK CRACK TREATMENT

The Contractor shall use all means necessary to minimize the development of shrinkage cracks.

The Contractor shall remove all equipment and materials from the deck and clean the surface as necessary for the Engineer to measure the surface crack intensity. Surface crack intensity will be determined by the Engineer after completion of concrete cure, prior to prestressing, and prior to the release of falsework. In any 50-m² portion of deck within the limits of the new concrete deck, should the intensity of cracking be such that there are more than 5 m of cracks whose width at any location exceeds 0.5-mm, the deck shall be treated with methacrylate resin. The area of deck to be treated shall have a width that extends for the entire width of new deck inside the concrete barriers and a length that extends at least 1.5 m beyond the furthest single continuous crack outside the 50-m² portion, measured from where that crack exceeds 0.5-mm in width, as determined by the Engineer.

Deck crack treatment shall consist of test sealing, and furnishing and applying methacrylate resin in conformance with the requirements of these special provisions. If grinding operation is required, deck treatment shall take place after grinding.

Prior to the start of deck treatment work, the Contractor shall submit for approval by the Engineer, a program for public safety associated with the use of methacrylate resin. The program shall identify materials, equipment, and methods to be used. The Contractor shall not perform deck treatment work, other than that specifically authorized in writing by the Engineer, until the program has been approved.

If the measures being taken by the Contractor are inadequate to provide for public safety associated with use of methacrylate resin, the Engineer will direct the Contractor to revise the operations and the public safety program. Directions for revisions will be in writing and will specify the items in which the Contractor's program is inadequate. No further deck treatment shall be performed until public safety measures are adequate, and a revised program for public safety has been approved.

The Engineer will notify the Contractor of the approval or rejection of any submitted or revised program for public safety associated with the use of methacrylate resin within 10 working days of receipt of the final submitted program.

The State will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised program for public safety associated with the use of methacrylate resin, nor for any delays to the work due to the Contractor's failure to submit an acceptable program for public safety associated with the use of methacrylate resin. If the Engineer does not review or approve the program submitted by the Contractor within the time specified and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the program for public safety, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Materials

The material used for treating the deck shall be a low odor, high molecular weight methacrylate resin. Prior to adding initiator, the resin shall have a maximum volatile content of 30 percent when tested in conformance with the requirements in ASTM Designation: D 2369, and shall conform to the following:

A Material Safety Data Sheet shall be furnished prior to use for each shipment of high molecular weight methacrylate resin.

The promoter and initiator, if supplied separately from the resin, shall not be mixed directly with each other. Containers of promoters and initiators shall not be stored together in a manner that will allow leakage or spillage from one to contact the containers or material of the other.

Testing

The Contractor shall allow 14 days for sampling and testing by the Engineer of the high molecular weight methacrylate resin prior to proposed use.

The Contractor shall treat a test area within the project limits of approximately 50 m² at a location approved by the Engineer. Conditions during the test treatment shall be similar to those expected on the deck. Equipment used in the test shall be similar to those used for the deck treating operations. If the test area is on the traveled way, traffic shall not be allowed on the treated test area until (1) the treated surface is tack free (non-oily), (2) the sand cover adheres sufficiently to resist brushing by hand, and (3) the coefficient of friction of the deck is at least 0.35 when tested in conformance with the requirements in California Test 342.

Should the above requirements for traffic use not be met, the Contractor shall suspend treating of bridge decks until another test area is treated and complies with the requirements.

Construction

Prior to deck treatment with methacrylate resin, the bridge deck surface shall be cleaned by abrasive blasting and all loose material shall be blown from visible cracks using high-pressure air. Concrete curing seals shall be cleaned from the deck surface to be treated, and the deck shall be dry when blast cleaning is performed. If the deck surface becomes contaminated at any time prior to placing the penetrating sealer, the deck surface shall be cleaned by abrasive blasting.

Equipment shall be fitted with suitable traps, filters, drip pans, or other devices as necessary to prevent oil or other deleterious material from being deposited on the deck.

Where abrasive blasting is being performed within 3 m of a lane occupied by public traffic, the residue including dust shall be removed immediately after contact between the abrasive and the surface being treated. The removal shall be by a vacuum attachment operating concurrently with the abrasive blasting operation.

The relative humidity shall be less than 90 percent at time of treatment.

A compatible promoter/initiator system shall be capable of providing a resin gel time of not less than 40 minutes nor more than 1.5 hours at the temperature of application. Gel time shall be adjusted to compensate for the changes in temperature throughout treatment application.

The quantity of resin mixed with promoter and initiator shall be limited to 20 L at a time for manual application.

Machine application of the resin shall be performed by using a two-part resin system using a promoted resin for one part and an initiated resin for the other part. This two-part resin system shall be combined at equal volumes to the spray bars through separate positive displacement pumps. Combining of the 2 components shall be by either static in-line mixers or by external intersecting spray fans. The pump pressure at the spray bars shall not be great enough to cause appreciable atomization of the resin. Compressed air shall not be used to produce the spray. A shroud shall be used to enclose the spray bar apparatus. Hand held spray apparatus shall not be used.

Barrier rails, joints, and drainage facilities shall be adequately protected to prevent contamination by the treatment material. Contaminated items shall be repaired at the Contractor's expense.

The prepared area shall be dry and the surface temperature shall be less than or equal to 38°C when the resin is applied. The rate of application of promoted/initiated resin shall be approximately 2.5 square meters per liter, ± 0.1 square meter per liter.

The deck surfaces to be treated shall be flooded with resin, allowing penetration into the concrete and filling of all cracks. The treatment shall be applied within 5 minutes after complete mixing. A significant increase in viscosity shall be cause for rejection. Excess material shall be redistributed by squeegees or brooms within 10 minutes after application.

After the resin has been applied, at least 20 minutes shall elapse before applying sand. The sand shall be commercial quality dry blast sand. Ninety-five percent of the sand shall pass the 2.36-mm sieve, and 95 percent shall be retained on the 850- μ m sieve. The sand shall be applied at a rate of one kilogram per square meter, ± 0.1 kilogram per square meter.

Excess sand shall be removed from the deck surface by vacuuming or sweeping prior to opening to traffic.

Traffic shall not be allowed on the treated area until (1) the treated surface is tack free (non-oily), (2) the sand cover adheres sufficiently to resist brushing by hand, and (3) the coefficient of friction of the deck is at least 0.35 when tested in conformance with the requirements in California Test 342.

PRECAST PRESTRESSED CONCRETE BRIDGE MEMBERS

The anticipated deflection and method of accommodation of deflection of precast prestressed concrete girders, prior to the time the deck concrete is placed, shall be shown on the working drawings in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The deflection shall include the following:

- A. Anticipated upward deflection caused by the prestressing forces.
- B. Downward deflection caused by the dead load of the girder.
- C. Deflection caused by the creep and shrinkage of the concrete for the time interval between the stressing of the girders and the planned placement of the deck.

Such deflection shall be substantiated by calculations that consider the ages of the girder concrete at the time of stressing and the Contractor's planned placement of the deck. All deflection calculations shall be based on the concrete producer's estimate of the modulus of elasticity at the applicable concrete age.

Adjustments to accommodate girder deflections, which occur prior to the time the deck concrete is placed, may include revisions in bearing seat elevations, but any such adjustments shall be limited by the following conditions:

- A. The minimum permanent vertical clearance under the structure as shown on the plans shall not be reduced.
- B. The profile grade and cross slope of the deck shall not be changed.
- C. A minimum of 25 mm of deck slab concrete between the top of the precast girders and the deck slab reinforcement shall be maintained.

Girders with unanticipated girder deflection and which cannot comply with conditions A, B, and C will be rejected in conformance with the provisions in Section 6-1.04, "Defective Materials," of the Standard Specifications.

Adjustments to accommodate girder deflections will not be considered a change in dimensions. Full compensation for increases in the cost of construction, including increases in the quantity of deck or bearing seat concrete, resulting from adjustments to accommodate girder deflections shall be considered as included in the contract price paid for the various items of work involved and no additional compensation will be allowed therefor.

Temporary lateral bracing shall be provided for girders located over the roadway. The bracing shall be installed at each end of each girder, except notched ends, prior to the release of the erection equipment from the girder and shall remain in place until 2 days after the concrete diaphragms have been placed. The bracing shall be adequate to prevent overturning of the girders prior to completion of the work and as a minimum shall be capable of resisting a lateral force of 720 Pa of girder side area applied laterally in either direction to the top of the girder. Girder erection shall not be started until the temporary lateral bracing proposed for use by the Contractor has been approved by the Engineer.

MEASUREMENT AND PAYMENT

Measurement and payment for concrete in structures shall conform to the provisions in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for insert assemblies, where shown on the plans, shall be considered as included in the contract price paid per cubic meter for structural concrete (bridge) and no separate payment will be made therefor.

Full compensation for deck crack treatment, including a program for public safety and airborne monitoring, shall be considered as included in the contract price paid per cubic meter for structural concrete (bridge) and no additional compensation will be allowed therefor.

10-1.44 STRUCTURE APPROACH SLABS (Type N)

This work shall consist of constructing reinforced concrete approach slabs, structure approach drainage system, and treated permeable base at structure approaches in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

GENERAL

Attention is directed to "Engineering Fabrics" of these special provisions.

STRUCTURE APPROACH DRAINAGE SYSTEM

Geocomposite Drain

Geocomposite drain shall consist of a manufactured core not less than 6.35 mm thick nor more than 50 mm thick with one or both sides covered with a layer of filter fabric that will provide a drainage void. The drain shall produce a flow rate, through the drainage void, of at least 25 liters per minute per meter of width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 168 kPa. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for the geocomposite drain certifying that the drain produces the required flow rate and complies with these special provisions. The Certificate of Compliance shall be accompanied by a flow capability graph for the geocomposite drain showing flow rates and the externally applied pressures and hydraulic gradients. The flow capability graph shall be stamped with the verification of an independent testing laboratory.

Filter fabric for the geocomposite drain shall conform to the provisions for fabric for underdrains in Section 88, "Engineering Fabrics," of the Standard Specifications.

The manufactured core shall be either a preformed grid of embossed plastic, a mat of random shapes of plastic fibers, a drainage net consisting of a uniform pattern of polymeric strands forming 2 sets of continuous flow channels, or a system of plastic pillars and interconnections forming a semirigid mat.

The core material and filter fabric shall be capable of maintaining the drainage void for the entire height of geocomposite drain. Filter fabric shall be integrally bonded to the side of the core material with the drainage void. Core material manufactured from impermeable plastic sheeting having nonconnecting corrugations shall be placed with the corrugations approximately perpendicular to the drainage collection system.

The geocomposite drain shall be installed with the drainage void and the filter fabric facing the embankment. The fabric facing the embankment side shall overlap a minimum of 75 mm at all joints and wrap around the exterior edges a minimum of 75 mm beyond the exterior edge. If additional fabric is needed to provide overlap at joints and wrap-around at edges, the added fabric shall overlap the fabric on the geocomposite drain at least 150 mm and be attached thereto.

Should the fabric on the geocomposite drain be torn or punctured, the damaged section shall be replaced completely or repaired by placing a piece of fabric that is large enough to cover the damaged area and provide a 150-mm overlap.

Plastic Pipe

Plastic pipe shall conform to the provisions for pipe for edge drains and edge drain outlets in Section 68-3, "Edge Drains," of the Standard Specifications.

Treated Permeable Base At Bottom Of Geocomposite Drains

Treated permeable base to be placed around the slotted plastic pipe at the bottom of geocomposite drains shall conform to the provisions in "Treated Permeable Base Under Approach Slabs." If asphalt treated permeable base is used, it shall be placed at a temperature of not less than 82°C nor more than 110°C.

The filter fabric to be placed over the treated permeable base at the bottom of geocomposite drains shall conform to the provisions for filter fabric for edge drains in Section 88, "Engineering Fabrics," of the Standard Specifications.

ENGINEERING FABRICS

Filter fabric to be placed between the structure approach embankment material and the treated permeable base shall conform to the provisions for filter fabric for edge drains in Section 88, "Engineering Fabrics," of the Standard Specifications and these special provisions.

The subgrade to receive the filter fabric, immediately prior to placing, shall conform to the compaction and elevation tolerance specified for the material involved.

Filter fabric shall be aligned, handled, and placed in a wrinkle-free manner in conformance with the manufacturer's recommendations.

Adjacent borders of the filter fabric shall be overlapped from 300 to 450 mm or stitched. The preceding roll shall overlap the following roll in the direction the material is being spread or shall be stitched. When the fabric is joined by stitching, it shall be stitched with yarn of a contrasting color. The size and composition of the yarn shall be as recommended by the fabric manufacturer. The number of stitches per 25 mm of seam shall be 5 to 7.

Equipment or vehicles shall not be operated or driven directly on the filter fabric.

TREATED PERMEABLE BASE UNDER APPROACH SLAB

Treated permeable base under structure approach slabs shall consist of constructing either an asphalt treated permeable base or a cement treated permeable base in accordance with Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.

The type of treatment, asphalt or cement, to be used shall be at the option of the Contractor.

The Contractor shall notify the Engineer in writing, not less than 30 days prior to the start of placing the treated permeable base, which type of treated permeable base will be furnished. Once the Contractor has notified the Engineer of the selection, the type to be furnished shall not be changed without a prior written request to do so and approval thereof in writing by the Engineer.

Asphalt treated permeable base shall be placed at a temperature of not less than 93°C nor more than 121°C. Material stored in excess of 2 hours shall not be used in the work.

Asphalt treated permeable base material may be spread in one layer. The base material shall be compacted with a vibrating shoe type compactor or rolled with a roller weighing at least 1.3 tonnes but no more than 4.5 tonnes. Rolling shall begin as soon as the mixture has cooled sufficiently to support the weight of the rolling equipment without undue displacement.

Cement treated permeable base material may be spread in one layer. The base material shall be compacted with either a vibrating shoe type compactor or with a steel-drum roller weighing at least 1.3 tonnes but no more than 4.5 tonnes. Compaction shall follow within one-half hour after the spreading operation and shall consist of 2 complete coverages of the treated material.

APPROACH SLABS

Concrete for use in approach slabs shall contain not less than 400 kilograms of cementitious material per cubic meter.

The steel angle at the concrete barrier joint shall conform to the provision in Section 75-1.03, "Miscellaneous Metal," of the Standard Specifications.

Structure approach slabs shall be cured for not less than 5 days prior to opening to public traffic, unless, at the option of the Contractor, the structure approach slabs are constructed using concrete with a non-chloride Type C chemical admixture conforming to these special provisions.

Structure approach slabs shall be cured for not less than 5 days prior to opening to public traffic, unless, at the option of the Contractor, the structure approach slabs are constructed using concrete with a non-chloride Type C chemical admixture.

Portland cement for use in concrete using a non-chloride Type C chemical admixture shall be Type II Modified, Type II Prestress, or Type III. Type II Modified and Type III cement shall conform to the provisions in Section 90-2.01, "Cement," of the Standard Specifications. Type II Prestress cement shall conform to the requirements of Type II Modified cement, except the mortar containing the portland cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not contract in air more than 0.053-percent.

The non-chloride Type C chemical admixture, approved by the Engineer, shall conform to the requirements in ASTM Designation: C 494 and Section 90-4, "Admixtures," of the Standard Specifications.

The concrete with non-chloride Type C chemical admixture shall be prequalified prior to placement in conformance with the provisions for prequalification of concrete specified by compressive strength in Section 90-9.01, "General," of the Standard Specifications and the following:

- A. Immediately after fabrication of the 5 test cylinders, the cylinders shall be stored in a temperature medium of $21 \pm 1.5^{\circ}\text{C}$ until the cylinders are tested.
- B. The 6-hour average strength of the 5 test cylinders shall not be less than 5.85 MPa. No more than 2 test cylinders shall have a strength of less than 5.5 MPa.

The top surface of approach slabs shall be finished in conformance with the provisions in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications. Edges of slabs shall be edger finished.

Approach slabs shall be cured with pigmented curing compound (1) in conformance with the provisions for curing structures in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications.

Structure approach slabs constructed using concrete with a non-chloride Type C chemical admixture shall be cured for not less than 6 hours prior to opening to public traffic. The curing period shall be considered to begin at the start of discharge of the last truck load of concrete to be used in the slab.

If the ambient temperature is below 18°C during the curing period for approach slabs using concrete with a non-chloride Type C chemical admixture, an insulating layer or blanket shall be used to cover the surface. The insulating layer or blanket shall have an R-value rating given in the table below. At the Contractor's option, a heating tent may be used in lieu of or in combination with the insulating layer or blanket.

Temperature range during curing period	R-value, minimum
13°C to 18°C	1
7°C to 13°C	2
4°C to 7°C	3

JOINTS

Hardboard and expanded polystyrene shall conform to the provisions in Section 51-1.12D, "Sheet Packing, Preformed Pads and Board Fillers," of the Standard Specifications.

Type AL joint seals shall conform to the provisions in Section 51-1.12F, "Sealed Joints" of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods.

The pourable seal between the steel angle and concrete barrier shall conform to the requirements for Type A and AL seals in Section 51-1.12F(3), "Materials and Installation," of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods. Immediately prior to placing the seal, the joint shall be thoroughly cleaned, including abrasive blast cleaning of the concrete surfaces, so that all foreign material and concrete spillage are removed from all joint surfaces. Joint surfaces shall be dry at the time the seal is placed.

MEASUREMENT AND PAYMENT

Structural concrete, approach slab (Type N) and structural concrete will be measured and paid for in conformance with the provisions in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for the structure approach drainage system including geocomposite drain, plastic pipe, treated permeable base, filter fabric, miscellaneous metal, pourable seals, shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab of the type shown in the Engineer's Estimate, and no additional compensation will be allowed therefor.

10-1.45 DRILL AND BOND DOWELS

Drilling and bonding dowels shall conform to the details shown on the plans, the provisions in Section 83-2.02D(1), "General," of the Standard Specifications, and these special provisions.

Dowels shall conform to the provisions for bar reinforcement in "Reinforcement" of these special provisions.

If reinforcement is encountered during drilling before the specified depth is attained, the Engineer shall be notified. Unless the Engineer approves coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

Unless otherwise provided, dowels to be bonded into drilled holes will be paid for as bar reinforcing steel (bridge).

Unless otherwise provided, drilling and bonding dowels will be measured and paid for by the meter determined by the number and the required depth of holes as shown on the plans or as ordered by the Engineer.

The contract price paid per meter for drill and bond dowel shall include full compensation for furnishing all labor, materials (except reinforcing steel dowels), tools, equipment, and incidentals, and for doing all the work involved in drilling the holes, including coring through reinforcement when approved by the Engineer, and bonding the dowels, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.46 SEALING JOINTS

Joints in concrete bridge decks and joints between concrete structures and concrete approach slabs shall be sealed in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

Where polyurethane seals are shown on the plans, a silicone sealant conforming to the provisions in Section 51-1.12F, "Sealed Joints," of the Standard Specifications may be used.

When ordered by the Engineer, a joint seal larger than called for by the Movement Rating shown on the plans shall be furnished and installed. Payment to the Contractor for furnishing the larger seal and for saw cutting the increment of additional depth of groove required will be determined as provided in Section 4-1.03, "Changes," of the Standard Specifications.

10-1.47 REFINISHING BRIDGE DECKS

Surfaces of bridge decks that are exposed when existing railings, curbs, or sidewalks are removed shall be prepared and refinished flush with the adjoining deck surface with portland cement concrete or rapid setting concrete, at the option of the Contractor, in conformance with these special provisions.

The exact area to be refinished will be designated by the Engineer.

Attention is directed to "Public Safety" of these special provisions.

When work is being performed within 3 m of a traffic lane or performed over traffic, dust and residue from deck preparation and cleaning shall be removed or controlled by vacuum, water spray, or shield methods approved by the Engineer.

Concrete shall be removed without damage to concrete that is to remain in place. Damage to concrete which is to remain in place shall be repaired to a condition satisfactory to the Engineer.

The concrete in deck areas to be refinished shall be removed to a depth of approximately 20 mm below the adjoining deck surface. A 20 mm deep saw cut shall be made along the perimeter of areas prior to removing the concrete.

Existing areas of the deck more than 20 mm below the adjoining deck surface shall be prepared by removing not less than 6 mm of surface material to expose sound aggregates.

Concrete removal may be done by abrasive blast cutting, abrasive sawing, impact tool cutting, machine rotary abrading, or by other methods, all to be approved by the Engineer. Cut areas shall be cleaned free of dust and all other loose and deleterious materials by brooming, abrasive blast cleaning, and high pressure air jets. Equipment shall be fitted with suitable traps, filters, drip pans or other devices to prevent oil or other deleterious matter from being deposited on the deck.

Existing reinforcement, exposed during the removal of concrete, that is to remain in place shall be protected from damage.

Steel dowels shall be cut off flush with the existing concrete or cut off at the bottom of concrete removal, whichever is lower. Patching around or over dowels in sound concrete will not be required. Existing voids around dowels, where refinishing is not required, shall be chipped back to sound concrete, the dowels removed 25 mm below the finished surface, and the hole filled with rapid setting concrete.

Refinishing isolated high areas in the existing deck may be accomplished by cutting the concrete down to be flush with the plane of the adjoining deck surface by abrasive sawing, grinding, impact tool cutting, or by other methods to be approved by the Engineer. When grinding is performed to bring the deck concrete flush with the adjoining deck surface, the resulting surface shall have a coefficient of friction of not less than 0.35 as determined by California Test 342.

PORTLAND CEMENT CONCRETE

An epoxy adhesive shall be applied to the surfaces to be refinished before placing the portland cement concrete. Immediately prior to applying the adhesive, the area to receive the adhesive shall be cleaned by abrasive blasting and blown clean by compressed air to remove dust and any other loose material. The area to be covered shall be surface dry and the ambient temperature shall be 10°C or above when the adhesive is applied.

The epoxy adhesive shall be furnished and applied in conformance with the provisions in Section 95-1, "General," and Section 95-2.03, "Epoxy Resin Adhesive for Bonding New Concrete to Old Concrete," of the Standard Specifications. Whenever the ambient temperature is below 18°C, Type II epoxy shall be used. The exact rate of applying epoxy adhesive will be as determined by the Engineer. The adhesive shall be worked onto the surface with stiff brushes or equal.

Portland cement concrete used to fill the prepared areas shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and the following:

- A. The concrete shall contain a minimum of 400 kilograms of portland cement per cubic meter.
- B. The amount of free water used in concrete shall not exceed 166 kg/m³.
- C. The aggregate shall contain between 50 and 55 percent fine aggregate and the remainder shall be pea gravel. The grading of pea gravel shall be such that 100 percent passes the 12.5 mm screen and not more than 5 percent passes the 1.18 mm sieve, unless a larger size is ordered by the Engineer.

- D. Admixtures shall be furnished and used if directed by the Engineer.
- E. Immediately after depositing on the newly placed adhesive, the portland cement concrete shall be thoroughly consolidated until all voids are filled and free mortar appears on the surface and then struck off to the required grade.
- F. Concrete shall be cured as provided in Section 90-7.03, "Curing Structures," of the Standard Specifications.
- G. No loads of any kind shall be applied to the portland cement concrete for at least 7 days after placing, unless otherwise permitted by the Engineer.

RAPID SETTING CONCRETE

The concrete used to fill the prepared areas shall be a high-strength material consisting of either magnesium phosphate concrete, modified high alumina based concrete, or portland cement based concrete. Magnesium phosphate concrete shall conform to the requirements for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions. Modified high alumina based concrete and portland cement based concrete shall be water activated and shall conform to the requirements for single component (water activated) magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and the following:

- A. A clean uniform rounded aggregate filler may be used to extend the concrete. The moisture content of the aggregate shall not exceed 0.5 percent. Grading of the aggregate shall conform to the following:

Sieve Size	Percentage Passing
12.5 mm	100
1.18 mm	0-5

- B. The amount of aggregate filler shall conform to the manufacturer's recommendation, but in no case shall the concrete strengths be less than that specified for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications.
- C. Mixing of components of dual component (with a prepackaged liquid activator) magnesium phosphate shall be by complete units, supplied by the manufacturer. Portions of units shall not be used. Water shall not be added to dual component magnesium phosphate.
- D. Immediately prior to applying the rapid setting concrete, the surface shall be dry and blown clean by compressed air to remove accumulated dust and any other loose material. If the surface becomes contaminated at any time prior to placing the concrete, the surface shall be cleaned by abrasive blasting. The surface temperature of the areas to be covered shall be 4°C or above when the concrete is applied. Methods proposed to heat said surfaces are subject to approval by the Engineer. The surface for the magnesium phosphate concrete shall be dry. The surfaces for modified high alumina based concrete or portland cement based concrete may be damp but not saturated.
- E. Magnesium phosphate concrete shall not be mixed in containers or worked with tools containing zinc, cadmium, aluminum or copper. Modified high alumina based concrete shall not be mixed in containers or worked with tools containing aluminum.
- F. Concrete shall not be retempered. Finishing tools that are cleaned with water shall be thoroughly dried before working the concrete.
- G. When placing concrete on slopes exceeding 5 percent, the Engineer may require the Contractor to provide a flow controlled modified material.
- H. Modified high alumina based concrete and portland cement based concrete shall be cured in conformance with the provisions in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. Magnesium phosphate concrete shall not be cured.
- I. Unless otherwise permitted in writing by the Engineer, public traffic shall not be permitted on the new concrete until at least 24 hours after final set.

FINISHING REQUIREMENTS

In advance of the curing operations, the surface of the concrete shall be textured by brooming with a stiff bristled broom or by other suitable devices which will result in uniform scoring. Brooming shall be performed transversely. The operation shall be performed at a time and in a manner that produces a hardened surface having a uniform texture and a coefficient of friction of not less than 0.35 as determined by California Test 342.

Refinished surfaces that are found to have a coefficient of friction less than 0.35 shall be ground or grooved by the Contractor at his expense in conformance with the applicable provisions in Section 42, "Groove and Grind Pavement," of the Standard Specifications.

In the longitudinal direction, refinished surfaces shall not vary more than 6 mm from the lower edge of a 3.6 m straightedge. The refinished surface shall be flush with the existing adjoining surface.

MEASUREMENT AND PAYMENT

No adjustment of compensation will be made for any increase or decrease in the quantity of refinish bridge deck, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications shall not apply to the contract item of refinish bridge deck.

Refinish bridge deck shall include furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in refinishing areas of the existing bridge deck (including cutting steel dowels), complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for refinish bridge deck shall be considered as included in the contract price paid per cubic meter for structural concrete (bridge) and no separate payment compensation will be made.

10-1.48 PREPARE AND PAINT CONCRETE SURFACES

This work shall consist of preparing and painting concrete surfaces, where shown on the plans, and in conformance with these special provisions.

Materials

The paint shall be a light-stable, alkali-resistant, acrylic latex or acrylic latex copolymer emulsion, commercially manufactured for use as an exterior concrete coating. The paint shall conform to the provisions in Section 91-4.05, "Paint: Acrylic Emulsion, Exterior White and Light and Medium Tints," of the Standard Specifications.

The paint shall be formulated and applied so that the color of the coated concrete matches Federal Standard 595BA No. 30227.

Referee Sample

Test Panel

A test panel at least 2.0 m x 2.0 m in size shall be successfully completed at a location approved by the Engineer before beginning work on architectural texture or painting concrete. The test panel shall be representative of paint concrete surfaces and the architectural surface texture, as shown on the plans. The test panel shall be constructed, finished, and painted with the materials, tools, equipment, personnel, and methods to be used in constructing, finishing, and painting the concrete surfaces. If ordered by the Engineer, additional test panels shall be constructed and finished until the specified finish, texture, and color are obtained, as determined by the Engineer.

The test panel approved by the Engineer shall be used as the standard for comparison in determining acceptability of architectural texture and painting for concrete surfaces.

The Contractor shall submit to the Engineer, not less than one week prior to initial application of the concrete coating to the test panel, a copy of the manufacturer's recommendations and written application instructions.

Surface Preparation

New concrete surfaces to be painted shall be cured in conformance with the provisions in Section 90-7.03, "Curing Structures," of the Standard Specifications.

Concrete surfaces to be painted shall be prepared in conformance with the requirements of SSPC-SP 13, "Surface Preparation of Concrete," of the Structural Steel Painting Council. After concrete surface preparation is complete, the Contractor shall clean all concrete surfaces to be painted by water rinsing as defined in Section 59-1.03, "Application," of the Standard Specifications.

Painting Concrete

The coating shall be applied per the manufacturer's recommendations and in conformance with the requirements of SSPC-SP 11, "Guide for Coating Concrete," of the Structural Steel Painting Council.

Any damaged areas shall be repaired in the same manner as the original surface preparation and paint application.

Measurement and Payment

Concrete surfaces to be prepared and painted will be measured by the square meter. Measurement will be determined along the surface of the actual areas painted.

Full compensation for preparing and painting concrete surfaces shall be considered as included in the contract price paid per square meter for architectural texture of the types listed in the Engineer's Estimate and no separate payment will be made therefor.

10-1.49 ARCHITECTURAL SURFACE (TEXTURED CONCRETE)

Architectural texture for concrete surfaces shall conform to the details shown on the plans and the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Architectural textures listed below are required at concrete surfaces shown on the plans:

- A. Fractured rib texture
- B. Formed relief texture
- C. Aesthetic imprint texture

The fractured rib texture shall be an architectural texture simulating the appearance of straight ribs of concrete with a fractured concrete texture imparted to the raised surface between the ribs. Grooves between ribs shall be continuous with no apparent curves or discontinuities. Variation of the groove from straightness shall not exceed 6 mm for each 3 m of groove. The architectural texture shall have random shadow patterns. Broken concrete at adjoining ribs and groups of ribs shall have a random pattern. The architectural texture shall not have secondary patterns imparted by shadows or repetitive fractured surfaces.

The splitface running bond block texture shall be an architectural concrete surface texture simulating the pattern and texture of a split face concrete masonry unit wall in a running bond pattern. The running bond of the simulated concrete masonry wall shall be continuous between forms. The running bond pattern shall consist of full courses. A partial course may occur only when needed as the bottom course. Simulated mortar joints shall be flush. Vertical mortar joints shall be aligned plumb with horizontal joints running perpendicular to vertical joints. The split face texture shall be random and not have secondary patterns imparted by shadows or repetitive split face surfaces. The concrete surface texture shall not exceed 19-mm relief. The concrete surface texture areas shall be sharp and crisp with out easing or rounding.

The aesthetic imprint texture shall simulate a formed relief constructed to the dimensions and shapes shown on the plans. Corners at the intersection of plane surfaces shall be sharp and crisp without easing or rounding. Surface finish shall be applied to the architectural texture.

TEST PANEL

A test panel at least 2.0 m x 2.0 m in size shall be successfully completed at a location approved by the Engineer before beginning work on architectural textures. The test panel shall be constructed and finished with the materials, tools, equipment and methods to be used in constructing the architectural texture, including areas representative of the fractured rib, splitface running bond block, aesthetic imprint, and split slate. If ordered by the Engineer, additional test panels shall be constructed and finished until the specified finish, texture and color are obtained, as determined by the Engineer.

The test panel approved by the Engineer shall be used as the standard of comparison in determining acceptability of architectural texture for concrete surfaces.

FORM LINERS

Form liners shall be used for textured concrete surfaces and shall be installed in conformance with the manufacturer's recommendations, unless other methods of forming textured concrete surfaces are approved by the Engineer. Form liners shall be manufactured from an elastomeric material or a semi-elastomeric polyurethane material by a manufacturer of commercially available concrete form liners. No substitution of other types of formliner material will be allowed. Form liners shall leave crisp, sharp definition of the architectural surface. Recurring textural configurations exhibited by repeating, recognizable shadow patterns shall be prevented by proper casting of form liner patterns. Textured concrete surfaces with such recurring textural configurations shall be reworked to remove such patterns as approved by the Engineer or the concrete shall be replaced.

Form liners shall have the following properties:

Description	ASTM Designation:	Range
Elastomeric material		
Shore A hardness	D 2240	20 to 65
Tensile strength (MPa)	D 412	0.9 to 6.2
Semi-elastomeric polyurethane		
Shore D hardness	D 2240	55 to 65
Tensile strength (MPa)	D 2370	18 minimum

Cuts and tears in form liners shall be sealed and repaired in conformance with the manufacturer's recommendations. Form liners that are delaminated from the form shall not be used. Form liners with deformations to the manufactured surface caused by improper storage practices or any other reason shall not be used.

Form liners shall extend the full length of texturing with transverse joints at 2.5 m minimum spacing. Small pieces of form liners shall not be used. Grooves shall be aligned straight and true. Grooves shall match at joints between form liners. Joints in the direction of grooves in grooved patterns shall be located only in the depressed portion of the textured concrete. Adjoining liners shall be butted together without distortion, open cracks or offsets at the joints. Joints between liners shall be cleaned before each use to remove any mortar in the joint.

Adhesives shall be compatible with the form liner material and with concrete. Adhesives shall be approved by the liner manufacturer. Adhesives shall not cause swelling of the liner material.

RELEASING FORM LINERS

Products and application procedures for form release agents shall be approved by the form liner manufacturer. Release agents shall not cause swelling of the liner material or delamination from the forms. Release agents shall not stain the concrete or react with the liner material. For reliefs simulating fractured concrete or wood grain surfaces the application method shall include the scrubbing method using a natural bristle scrub brush in the direction of grooves or grain. The release agent shall coat the liner with a thin film. Following application of form release agent, the liner surfaces shall be cleaned of excess amounts of agent using compressed air. Buildup of form release agent caused by the reuse of a liner shall be removed at least every 5 uses.

Form liners shall release without leaving particles or pieces of liner material on the concrete and without pulling or breaking concrete from the textured surface. The concrete surfaces exposed by removing forms shall be protected from damage.

ABRASIVE BLASTING

The architectural texture shall be abrasive blasted with fine abrasive to remove the sheen without exposing coarse aggregate.

CURING

Concrete surfaces with architectural texture shall be cured only by the forms-in-place or water methods. Seals and curing compounds shall not be used.

MEASUREMENT AND PAYMENT

Architectural texture will be measured and paid for by the square meter.

The contract price paid per square meter for architectural texture of the types listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in architectural texture, complete in place, including preparing and painting concrete surfaces, anti-graffiti coating, test panels, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.50 REINFORCEMENT

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

Individual hoops, made continuous with butt welded splices, which are substituted for spiral reinforcement, shall conform to the requirements for "Ultimate Butt Splices" of these special provisions.

Service splices shown on the plans shall conform to the requirements for butt welded splices and mechanical butt splices of Section 52, "Reinforcement," of the Standard Specifications. Lap splicing of these bars will not be allowed.

ULTIMATE BUTT SPLICES

Ultimate butt splices shall be either welded or mechanical splices, shall be used at the locations shown on the plans, and shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

General Requirements

The Contractor shall designate in writing an ultimate butt splicing Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for 1) the quality of all ultimate butt splicing including the inspection of materials and workmanship performed by the Contractor and all subcontractors; and 2) submitting, receiving, and approving all correspondence, required submittals, and reports regarding ultimate butt splicing to and from the Engineer.

The QCM shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project. The QCM may be an employee of the Contractor.

The length of any type of ultimate mechanical butt splice shall not exceed 10 times the bar diameter of the larger bar to be spliced.

All ultimate prejob, production, and job control sample splices shall be 1) a minimum length of 1.5 meters for reinforcing bars No. 25 or smaller and 2 meters for reinforcing bars No. 29 or larger, with the splice located at mid-point, and 2) suitably identified prior to shipment with weatherproof markings that do not interfere with the Engineer's tamper-proof markings or seals. Any splice that shows signs of tampering will be rejected.

A minimum of one control bar shall be removed from the same bar as, and adjacent to, all ultimate prejob, production, and job control sample splices. Control bars shall be 1) a minimum length of one meter for reinforcing bars No. 25 or smaller and 1.5 meters for reinforcing bars No. 29 or larger, and 2) suitably identified prior to shipment with weatherproof markings that do not interfere with the Engineer's tamper-proof markings or seals. The portion of adjacent bar remaining in the work shall also be identified with weatherproof markings that correspond to its adjacent control bar.

Shorter length sample splice and control bars may be furnished if approved in writing by the Engineer.

Each sample splice and its associated control bar shall be identified and marked as a set. Each set shall be identified as representing a prejob, production, or job control sample splice.

The portion of hoop reinforcing bar, removed to obtain a sample splice and control bar, shall be replaced using a prequalified ultimate mechanical butt splice, or the hoop shall be replaced in kind.

Reinforcing bars, other than hoops, from which sample splices are removed, shall be repaired using ultimate mechanical butt splices conforming to the provisions in "Prejob Test Requirements for Ultimate Butt Splices" specified herein, or the bars shall be replaced in kind. These bars shall be repaired or replaced such that no splices are located in the "No Splice Zone" shown on the plans.

Section 52-1.08E, "Job Control Tests," of the Standard Specifications shall not apply.

The provisions for total slip shall not apply to any ultimate splices that are welded or that are used on hoops.

The independent qualified testing laboratory used to perform the testing of all ultimate butt sample splices and control bars shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors who will provide other services or materials for the project, and shall have the following:

- A. Proper facilities, including a tensile testing machine capable of breaking the largest size of reinforcing bar to be tested.
- B. A device for measuring the total slip of the reinforcing bars across the splice to the nearest 25 μ m, that, when placed parallel to the longitudinal axis of the bar is able to simultaneously measure movement across the splice, at 2 locations, 180 degrees apart.

- C. Operators who have received formal training for performing the testing requirements of ASTM Designation: A 370/A 370M and California Test 670.
- D. A record of annual calibration of testing equipment performed by an independent third party that has 1) standards that are traceable to the National Institute of Standards and Technology, and 2) a formal reporting procedure, including published test forms.

Ultimate Butt Splice Test Criteria

Ultimate prejob, production, and job control sample splices shall be tensile tested in conformance with the requirements described in ASTM Designation: A 370/A 370M and California Test 670.

Ultimate prejob and production sample splices shall rupture in the reinforcing bar either: 1) outside of the affected zone or 2) within the affected zone, provided that the sample has achieved at least 95 percent of the ultimate tensile strength of the control bar associated with the sample. In addition, necking of the bar shall be visibly evident at rupture regardless of whether the bar breaks inside or outside the affected zone.

The affected zone is the portion of the reinforcing bar where any properties of the bar, including the physical, metallurgical, or material characteristics, have been altered by fabrication or installation of the splice.

The ultimate tensile strength of each control bar shall be determined by tensile testing the bar to rupture and shall be determined for all control bars, regardless of where each sample splice ruptures. If 2 control bars are tested for one sample splice, the bar with the lower ultimate tensile strength shall be considered the control bar.

Testing to determine the minimum tensile strength, in conformance with the provisions in the ninth paragraph of Section 52-1.08, "Splicing," of the Standard Specifications, will not be required.

Prejob Test Requirements for Ultimate Butt Splices

Prior to use in the work, all ultimate butt splices shall conform to the following prejob test requirements:

- A. Eight prejob sample splices for each bar size of each splice type including ultimate mechanical butt splices, ultimate complete joint penetration butt welded splices, and ultimate resistance butt welded splices, that will be used in the work, shall be fabricated by the Contractor. For deformation-dependent types of couplers, 8 sample prejob splices shall also be fabricated for each reinforcing bar size and deformation pattern that will be used in the work.
- B. The sample splices shall be fabricated using the same splice materials, position, operators, location, and equipment, and following the same procedures as will be used to make the splices in the work.
- C. At the option of the Contractor, operator qualification tests may be performed simultaneously with the preparation of prejob sample splices.
- D. If different diameters of hoops are shown on the plans, prejob sample splices, as described above, will only be required for the smallest hoop diameter. In addition, these splices shall be fabricated using the same radius as shown on the plans for these hoops.
- E. Unless otherwise directed in writing by the Engineer, 4 prejob sample splices and control bar sets shall be shipped to the Transportation Laboratory and the remaining 4 sets shall be tested by the Contractor's independent qualified testing laboratory.
- F. Each group of 4 sets from a prejob test shall be securely bundled together and identified by location and contract number with weatherproof markings prior to shipment. Bundles containing fewer than 4 sets will not be tested by the Transportation Laboratory, nor shall they be tested by the independent laboratory.
- G. All 8 sample splices from each prejob test shall conform to the provisions in "Ultimate Butt Splice Test Criteria" specified herein.
- H. Prior to performing any tensile tests on prejob test sample splices, one of the 4 samples shall be tested for, and shall conform to, the provisions for total slip. Should this sample not meet these requirements, one retest, in which the 3 remaining samples are tested for total slip, will be allowed. All 3 of these remaining samples tested shall conform to the aforementioned slip requirements.
- I. For each bundle of 4 sets, a Prejob Test Report shall be prepared by the independent testing laboratory performing the testing. The report shall 1) be signed by an engineer who represents the laboratory and is registered as a Civil Engineer in the State of California; 2) include, as a minimum, the following information for each set: contract number, bridge number, bar size, type of splice, length of mechanical splice, physical condition of test sample splice and control bar, any notable defects, limits of affected zone, total measured slip, location of visible necking area, ultimate strength of each splice, ultimate strength and 95 percent of this ultimate strength for each control bar, and a comparison between 95 percent of the ultimate strength of each control bar and the ultimate strength of its associated splice; and 3) be submitted to the QCM for review and approval, and then to the Engineer.

- J. Test results for each bundle of 4 sets will be reported in writing to the Contractor within 10 working days after receipt of the bundle by the Transportation Laboratory. In the event that more than one bundle is received on the same day, 2 additional working days shall be allowed for providing test results for each additional bundle received. A test report will be made for each bundle received.
- K. Should the Engineer fail to provide the test results within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in providing the test results, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Production Test Requirements for Ultimate Butt Splices

Production tests shall be performed for all ultimate butt splices used in the work. A production test shall consist of 4 sets of sample splices and control bars removed from each lot of completed splices, except when quality assurance tests are performed.

A lot of ultimate butt splices is defined as 1) 150, or fraction thereof, of the same type of ultimate mechanical butt splices used for each bar size and each bar deformation pattern that is used in the work or 2) 150, or fraction thereof, of ultimate complete joint penetration butt welded splices, or ultimate resistance butt welded splices for each bar size used in the work. If different diameters of hoop reinforcement are shown on the plans, separate lots shall be used for each different hoop diameter.

After all splices in a lot have been completed, the QCM shall notify the Engineer in writing that all couplers in this lot conform to the specifications and are ready for testing. The sample splices will either be selected by the Engineer at the job site or a fabrication facility, provided the facility is located within an 80-km radius of the jobsite.

After notification has been received, the Engineer will randomly select the 4 sample splices to be removed from the lot and place tamper-proof markings or seals on them. The Contractor or QCM shall select the adjacent control bar for each sample splice bar, and the Engineer will place tamper-proof markings or seals on them. These ultimate production sample splices and control bars shall be removed by the Contractor, and tested by an independent qualified testing laboratory, in the presence of either the Engineer or the Engineer's authorized representative.

The Engineer or the Engineer's authorized representative will be at the independent qualified testing laboratory within a maximum of 5 working days after receiving written notification that the samples are at the laboratory and ready for testing. Should the Engineer or the Engineer's authorized representative fail to be at the laboratory within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of this action, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

A sample splice or control bar from any set will be rejected if any tamper-proof marking or seal is disturbed prior to testing.

The 4 sets from each production test shall be securely bundled together and identified with a completed sample identification card prior to shipment to the independent laboratory. The card will be furnished by the Engineer. Bundles of samples containing fewer than 4 sets of splices shall not be tested.

A Production Test Report for all testing performed on each lot shall be prepared by the independent testing laboratory performing the testing and submitted to the QCM for review and approval. The report shall be signed by an engineer who represents the laboratory and is registered as a Civil Engineer in the State of California. The report shall include, as a minimum, the following information for each set: contract number, bridge number, lot number and location, bar size, type of splice, length of mechanical splice, physical condition of test sample splice and control bar, any notable defects, limits of affected zone, total measured slip, location of visible necking area, ultimate strength of each splice, ultimate strength and 95 percent of this ultimate strength for each control bar, and a comparison between 95 percent of the ultimate strength of each control bar and the ultimate strength of its associated splice.

The QCM must review, approve, and forward each Production Test Report to the Engineer for review before any splices represented by the report are encased in concrete. The Engineer shall have 3 working days to review each Production Test Report and respond in writing after a complete report has been received. Should the Contractor elect to encase any splices prior to receiving notification from the Engineer, it is expressly understood that the Contractor will not be relieved of the Contractor's responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Any material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase any splices pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Prior to performing any tensile tests on production test sample splices, one of the 4 samples shall be tested for, and shall conform to, the provisions for total slip. Should this sample not meet these requirements, one retest, in which the 3 remaining samples are tested for total slip, will be allowed. Should any of the 3 remaining samples not conform to these requirements, all splices in the lot represented by this production test will be rejected.

If 3 or more sample splices from any production test conform to the provisions in "Ultimate Butt Splice Test Criteria" specified herein, all splices in the lot represented by this production test will be considered acceptable.

Should only 2 sample splices from any production test conform to the provisions in "Ultimate Butt Splice Test Criteria" specified herein, one additional production test shall be performed on the same lot of splices. Should any of the 4 sample splices from this additional test fail to conform to these provisions, all splices in the lot represented by these production tests will be rejected.

If only one sample splice from any production test conforms to the provisions in "Ultimate Butt Splice Test Criteria" specified herein, all splices in the lot represented by this production test will be rejected.

If a production test for any lot fails, the Contractor will be required to repair or replace all reinforcing bars from which sample splices were removed, complete in place, before the Engineer selects any additional splices from this lot for further testing.

Whenever any lot of ultimate butt splices is rejected, additional ultimate butt splices shall not be used in the work until 1) the QCM performs a complete review of the Contractor's quality control process for these splices, 2) a written report is submitted to the Engineer describing the cause of failure for the splices in this lot and provisions for correcting these failures in future lots, and 3) the Engineer has provided the Contractor with written notification that the report is acceptable. The Engineer shall have 3 working days after receipt of the report to provide notification to the Contractor. Should the Engineer not provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of this action, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Production tests will not be required on any repaired splice from a lot, regardless of the type of prequalified ultimate mechanical butt splice used to make the repair.

Should an additional production test be required, the Engineer may select any repaired splice for use in the additional production test.

Quality Assurance Test Requirements for Ultimate Butt Splices

For the first production test performed, and for at least one, randomly selected by the Engineer, of every 5 additional production tests, or portion thereof, performed thereafter, the Contractor shall concurrently prepare 4 additional ultimate job control sample splices along with associated control bars. These ultimate job control samples shall be prepared in the same manner as specified herein for ultimate prejob sample splices and control bars.

Each time 4 additional ultimate job control sample splices are prepared, 2 of these job control sample splice and associated control bar sets and 2 of the production sample splice and associated control bar sets, together, shall conform to the requirements for ultimate production sample splices in "Production Test Requirements for Ultimate Butt Splices" specified herein.

The 2 remaining job control sample splice and associated control bar sets, along with the 2 remaining production sample splice and associated control bar sets shall be shipped, unless otherwise directed in writing by the Engineer, to the Transportation Laboratory for quality assurance testing. The 4 sets shall be securely bundled together and identified by location and contract number with weatherproof markings prior to shipment. Bundles containing fewer than 4 sets will not be tested.

Quality assurance testing will be performed in conformance with the requirements for ultimate production sample splices in "Production Test Requirements for Ultimate Butt Splices" specified herein.

Test results for each bundle of 4 sets will be reported in writing to the Contractor within 3 working days after receipt of the bundle by Transportation Laboratory. In the event that more than one bundle is received on the same day, 2 additional working days shall be allowed for providing test results for each additional bundle received. A test report will be made for each bundle received. Should the Contractor elect to encase any splices prior to receiving notification from the Engineer, it is expressly understood that the Contractor will not be relieved of the Contractor's responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Any material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase any splices pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

MEASUREMENT AND PAYMENT

Measurement and payment for reinforcement in structures shall conform to the provisions in Section 52-1.10, "Measurement," and Section 52-1.11, "Payment," of the Standard Specifications and these special provisions.

Full compensation for conforming to the provisions of "Ultimate Butt Splices," of these special provisions shall be considered as included in the contract prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

Full compensation for conforming to the provisions of "Service Butt Splices," of these special provisions shall be considered as included in the contract prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

10-1.51 SHOTCRETE

Shotcrete shall conform to the provisions in Section 51, "Concrete Structures," and Section 53, "Shotcrete," of the Standard Specifications and these special provisions.

Shotcrete operations shall completely encase all reinforcement and other obstructions shown on the plans. Exceptional care shall be taken to properly encase the reinforcement and other obstructions with shotcrete.

Attention is directed to the section, "Order of Work," in these special provisions regarding furnishing preconstruction shotcrete test panels.

Except for finish coats, shotcrete shall be applied by the wet-mix process only.

Finish coats, applied by the dry-mix process, may be used only when approved by the Engineer.

Shotcrete shall have a minimum compressive strength of 22.5 MPa at 28 days or as shown on the plans, whichever is greater. No shotcrete work shall be performed prior to verification by the Engineer of the required compressive strength.

Splicing of reinforcing bars No. 22 or larger in shotcrete shall be by butt splicing only.

The Contractor shall be responsible for obtaining and testing all required preconstruction and production test cores. All coring and testing shall be at the Contractor's expense and performed in the presence of the Engineer, unless otherwise directed. The Engineer shall be notified a minimum of 24 hours prior to the Contractor performing any coring or testing operations.

All cores shall be obtained and tested for compressive strength in conformance with the requirements in ASTM Designation: C 42. Cores used for determining compressive strength shall not contain any bar reinforcement or other obstructions. The testing shall be performed at an independent testing facility approved by the Engineer. A copy of the test results shall be furnished to the Engineer within 5 days following completion of testing.

All test panels shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

PRECONSTRUCTION REQUIREMENTS

Prior to performing shotcrete work, the Contractor shall construct at least 2 preconstruction shotcrete test panels for each mixture being considered unless otherwise specified.

The nozzleperson shall have a minimum of 3000 hours experience as a nozzleperson on projects with a similar application.

At least 10 working days prior to constructing any shotcrete test panels, the Contractor shall submit to the Engineer for approval, a Quality Control Plan (QCP) for the proposed method of shotcrete placement. The plan shall include the following:

- A. The number and qualifications of nozzlepersons available to place shotcrete, the number of nozzlepersons on-site at any time during the shotcrete placement, description of their work schedule, and the procedures for avoiding fatigue of any nozzleperson.
- B. The proposed method of placing shotcrete, including, but not limited to, application rates, details of any proposed construction joints and their locations, and methods for achieving the required thickness and surface finish.
- C. The procedure for curing shotcrete surfaces.
- D. The description of a debris containment system, to be used during the cleaning of bar reinforcing steel and concrete and placing of shotcrete, as required to provide for public safety.

The Engineer shall have 10 working days to review and approve the QCP submittal after a complete plan has been received. No construction of shotcrete test panels shall be performed until the QCP is approved by the Engineer. Should the Engineer fail to complete the review within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in approving the QCP, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Preconstruction shotcrete test panels shall be constructed by the nozzlepersons and application crew scheduled to do the work, using equipment, materials, mixing proportions, ambient temperatures and procedures proposed for the work. The preconstruction shotcrete test panels shall conform to the following:

- A. One shotcrete test panel, of the size determined by the Contractor, shall be unreinforced and shall have 3 cores taken from it and tested for compressive strength. The compressive strength shall be the average strength of the 3 cores, except that, if any core should show evidence of improper coring, the core shall be discarded and the compressive strength shall be the average strength of the remaining cores. The test panel shall be identified and submitted to the Engineer with the test results including a description of the mixture, proportions, and ambient temperature.
- B. One shotcrete test panel shall have the same (1) thickness, (2) bar size and amount of bar reinforcement or other obstructions and (3) positioning of bar reinforcement or obstructions as the most heavily reinforced section of shotcrete to be placed. The test panel shall be square with the length of the sides equal to at least 3 times the thickness of the most heavily reinforced section of shotcrete to be placed, but not less than 750 mm. After a minimum 7 days of cure, the test panel shall be broken by the Contractor, in the presence of the Engineer, into pieces no larger than 250 mm in greatest dimension. The surfaces of the broken pieces shall be dense and free of laminations and sand pockets, and shall verify that the bar reinforcement or other obstructions are completely encased.
- C. Both test panels shall be cured under conditions similar to the actual work.
- D. At the option of the Contractor, cores to be used for determining the compressive strength may be taken from the reinforced test panel described above in lieu of making a separate unreinforced test panel as described above. The compressive strength shall be the average strength of the 3 cores, except that, if any core should show evidence of improper coring or contains bar reinforcement or other obstructions, the core shall be discarded and the compressive strength shall be the average strength of the remaining cores. If cores are taken from the reinforced test panel, the panel shall not be broken into pieces, as described above, until it has cured for a minimum of 14 days.

The requirements for constructing preconstruction shotcrete test panels may be eliminated, when approved by the Engineer, if a test panel report and certified compressive strength test data are furnished from a State highway project with a similar application of approximately equal thickness, including similar amounts and placement of reinforcement or other obstructions. The nozzle person, proposed to be used, shall have constructed the test panel described in the test panel report. The test panel report shall list the names of the application crew, equipment used, materials, mixing proportions, ambient temperatures and procedures used to make the test panels. The certified compressive strength test data shall be for cores taken from the same test panels.

PLACING

An air blowpipe shall be used during shotcrete placement to remove rebound, overspray and other debris from the areas to receive shotcrete.

Construction joints shall be tapered, and shall conform to the provisions in Sections 51-1.13, "Bonding," of the Standard Specifications.

All overspray and rebound shall be removed prior to final set and before placement of shotcrete on adjacent surfaces.

Rebound or any other material which has already exited the nozzle shall not be reused.

Shotcrete shall be cured in conformance with the provisions of Section 90-7.03, "Curing Structures," of the Standard Specifications.

When a finish coat is to be used, all loose, uneven or excess material, glaze, and rebound shall be removed by brooming, scraping, or other means and the surface left scarified. Any surface deposits which take a final set shall be removed by abrasive blasting. Prior to placing the finish coat, the receiving surface shall be washed down with an air-water blast.

Shotcrete extending into the space shown on the plans for cast-in-place concrete shall be removed.

TESTING AND ACCEPTANCE

At least 3 production shotcrete test cores shall be taken from each 30 square meters or portion thereof of shotcrete placed each day. The cores shall be 76 mm in diameter. The location where cores are to be taken will be designated by the Engineer. Test cores shall be identified by the Contractor and a description of the core location and mixture, including proportions, shall be submitted to the Engineer with the test cores, immediately after coring. Cored holes shall be filled with mortar in conformance with the provisions in Section 51-1.135, "Mortar," of the Standard Specifications.

Upon receipt of the cores, the Engineer will perform a visual examination to determine acceptance, as described below. Within 48 hours after receipt, the Engineer will return the cores to the Contractor for compressive strength testing.

The compressive strength test shall be performed using the shotcrete production test cores described above. The compressive strength shall be the average strength of the 3 cores, except that, if any core should show evidence of improper coring, the core shall be discarded and the compressive strength shall be the average strength of the remaining cores.

The basis of acceptance for production shotcrete test cores shall be (1) that the core is dense and free of laminations and sand pockets, and shows that the reinforcement or other obstructions are completely encased and (2) the same as specified for test cylinders in the fourth and fifth paragraphs of Section 90-9.01, "General," of the Standard Specifications.

If any production test core shows signs of defective shotcrete as described in (1) above, the shotcrete represented by such test core will be rejected, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength and quality of the shotcrete placed in the work are acceptable.

The surface finish of the shotcrete shall conform to the provisions of Section 51-1.18, "Surface Finishes," of the Standard Specifications.

MEASUREMENT AND PAYMENT

Full compensation for the Quality Control Plan, constructing and breaking test panels, furnishing and testing cores and patching cored holes shall be considered as included in the contract price paid per cubic meter for shotcrete and no additional compensation will be allowed therefor.

10-1.52 SIGN STRUCTURES

Sign structures and foundations for overhead signs shall conform to the provisions in Section 56-1, "Overhead Sign Structures," of the Standard Specifications and these special provisions.

Before commencing fabrication of sign structures, the Contractor shall submit 2 sets of working drawings to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The working drawings shall include sign panel dimensions, span lengths, post heights, anchorage layouts, proposed splice locations, a snugging and tensioning pattern for anchor bolts and high strength bolted connections, and details for permanent steel anchor bolt templates. The working drawings shall be supplemented with a written quality control program that includes methods, equipment, and personnel necessary to satisfy the requirements specified herein and in the special provisions.

Working drawings shall be 559 mm x 864 mm or 279 mm x 432 mm in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, sign structure type and reference as shown on the contract plans, District-County-Route-Kilometer Post, and contract number.

The Engineer shall have 20 working days to review the sign structure working drawings after a complete submittal has been received. No fabrication or installation of sign structures shall be performed until the working drawings are approved in writing by the Engineer.

Should the Engineer fail to complete the review within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the sign structure working drawings, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

A permanent steel template shall be used to maintain the proper anchor bolt spacing.

One top nut, one leveling nut, and 2 washers shall be provided for the upper threaded portion of each anchor bolt.

Surfaces of base plates which are to come in contact with concrete, grout, or washers and leveling nuts shall be flat to within 3 mm tolerance in 305 mm, and to within 5 mm tolerance overall. Faying surfaces of plates in high-strength bolted connections including flange surfaces of field splices, chord joints, and frame junctures, and contact surfaces of plates used for breakaway slip base assemblies shall be flat to within 2 mm tolerance in 305 mm, and within 3 mm tolerance overall.

Thermally cut holes made in tubular members of sign supports, other than holes in base and flange plates, shall initially be made a minimum of 2 mm undersized, and then be mechanically enlarged by reaming or grinding to the final required size and shape. All edges shall have a surface roughness of not greater than 6.35 μm . Round holes may be drilled to the exact final diameter. No holes shall be made in members unless the holes are shown on the plans or are approved in writing by the Engineer.

Steel members used for overhead sign structures shall receive nondestructive testing (NDT) in conformance with AWS D1.1 and the following:

A.

Weld Location	Weld Type	Minimum Required NDT
Welds for butt joint welds in tubular sections, nontubular sections, and posts	CJP groove weld with backing ring	100% UT or RT
Longitudinal seam welds*	PJP groove weld	25% MT
	CJP groove weld	100% UT or RT
Welds for base plate, flange plate, or end cap to post or mast arm	CJP groove weld	25% UT or RT
	Fillet weld	25% MT
* Longitudinal seam welds shall have 60% minimum penetration, except that within 150 mm of any circumferential weld, longitudinal seam welds shall be CJP groove welds.		

- B. A written procedure approved by the engineer shall be used when performing UT on material less than 8 mm thick. Contoured shoes shall be used when performing UT on round tubular sections under 1270 mm in diameter.
- C. When less than 100 percent of a weld is specified for NDT, and if defects are found during this inspection, additional NDT shall be performed. This additional NDT shall be performed on 25 percent of the total weld for all similar welds, as determined by the Engineer, produced for sign structures in the project. If any portion of the additional weld inspected is found defective, 100 percent of all similar welds produced for sign structures in the project, as determined by the Engineer, shall be tested.

Circumferential welds and base plate to post welds may be repaired only one time without written permission from the Engineer.

Full compensation for furnishing anchor bolt templates and for testing of welds shall be considered as included in the contract price paid per kilogram for furnish sign structure and no additional compensation will be allowed therefor.

10-1.53 ROADSIDE SIGNS

Roadside signs shall be installed at the locations shown on the plans or where designated by the Engineer and in conformance with the provisions in Section 56-2, "Roadside Signs," of the Standard Specifications and these special provisions.

Wood posts shall be pressure treated after fabrication in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," of the Standard Specifications with creosote, creosote coal tar solution, creosote petroleum solution (50-50), pentachlorophenol in hydrocarbon solvent, copper naphthenate, ammoniacal copper arsenate, or ammoniacal copper zinc arsenate. In addition to the preservatives listed above, Southern yellow pine may also be pressure treated with chromated copper arsenate. When other than one of the creosote processes is used, blocks shall have a minimum retention of 6.4 kg/m³, and need not be incised.

Type N marker panels mounted on a post with a roadside sign shall be considered to be sign panels and will not be paid for as markers.

10-1.54 INSTALL ROADSIDE SIGN PANEL ON EXISTING POST

Roadside sign panels shall be installed on existing posts at the locations shown on the plans or where designated by the Engineer and in conformance with the provisions in Section 56-2.04, "Sign Panel Installation," of the Standard Specifications and these special provisions.

Cutting the ends of wood posts in the field and field application of wood preservatives shall conform to the provisions in the sixth paragraph in Section 56-2.02B, "Wood Posts," of the Standard Specifications.

Two holes shall be drilled in each existing post as required to provide a breakaway feature as shown on the plans.

Existing sign panels, as shown on the plans, shall be removed and disposed of as provided in Section 15, "Existing Highway Facilities," of the Standard Specifications.

Installing roadside sign panels on existing posts will be paid for by the unit as determined from actual count in place.

The contract unit price paid for install roadside sign panel on existing post shall include full compensation for furnishing all labor, materials (except State-furnished sign panels), tools, equipment, and incidentals, and for doing all the work involved in installing roadside sign panels on existing posts (including removing and disposing of existing sign panels and drilling holes in existing posts), complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.55 ALTERNATIVE PIPE

Alternative pipe culverts shall conform to the provisions in Section 62, "Alternative Culverts," of the Standard Specifications and these special provisions.

SPIRAL RIB PIPE

Spiral rib pipe shall conform to the provisions in "Corrugated Metal Pipe" of these special provisions, except for profile and fabrication requirements.

Spiral rib pipe shall, at the option of the Contractor, consist of either (1) three rectangular ribs spaced midway between seams with ribs 19 mm wide by 19 mm high at a maximum rib pitch of 191 mm, (2) two rectangular ribs and one half-circle rib equally spaced between seams with ribs 19 mm wide by 25 mm high at a maximum rib pitch of 292 mm. The half-circle rib diameter shall be spaced midway between the rectangular ribs or (3) two rectangular ribs equally spaced between seams with ribs 19 mm wide by 25 mm high at a maximum rib pitch of 213 mm. Rib pitch measured at right angles to the direction of the ribs may vary ± 13 mm.

Corrugated steel spiral rib pipe shall be fabricated by a continuous helical lock seam fabricated in conformance with the provisions in Section 66-3.03C(1), "Fabrication by Continuous Lock Seam," of the Standard Specifications.

Coupling bands for spiral rib pipe shall conform to the provisions in Section 66-1.07, "Coupling Bands," of the Standard Specifications. A coupling band shown on the plans or approved by the Engineer in conformance with the provisions in Section 61-1.02, "Performance Requirements for Culvert and Drainage Pipe Joints," of the Standard Specifications, for use on a pipe corrugation of 68 mm x 13 mm for corrugated metal pipe may be used on spiral rib pipe having 68 mm x 13 mm rerolled annular ends. The width of band (W) for hat bands for pipe sizes larger than 1200 mm in diameter shall be 95 mm.

10-1.56 REINFORCED CONCRETE PIPE

Reinforced concrete pipe shall conform to the provisions in Section 65, "Reinforced Concrete Pipe," of the Standard Specifications and these special provisions.

Where embankment will not be placed over the top of the pipe, a relative compaction of not less than 85 percent shall be required below the pipe spring line for pipe installed using Method 1 backfill in trench, as shown on Standard Plan A62D. Where the pipe is to be placed under the traveled way, a relative compaction of not less than 90 percent shall be required unless the minimum distance between the top of the pipe and the pavement surface is the greater of 1.2 m or one half of the outside diameter of the pipe.

Except as otherwise designated by classification on the plans or in the specifications, joints for culvert and drainage pipes shall conform to the plans or specifications for standard joints.

When reinforced concrete pipe is installed in conformance with the details shown on Revised Standard Plan A62DA, the fifth paragraph of Section 19-3.04, "Water Control and Foundation Treatment," of the Standard Specifications shall not apply.

10-1.57 CORRUGATED METAL PIPE

Corrugated steel pipe culverts shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications and these special provisions.

Polymeric sheet coating shall be placed on the outside and inside surfaces of the pipe.

10-1.58 MISCELLANEOUS FACILITIES

Corrugated Steel Pipe Inlets shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications and these special provisions.

10-1.59 SLOPE PAVING (CONCRETE)

Slopes under the ends of bridges at retaining wall 189 shall be paved in conformance with the provisions in Section 72-6, "Slope Paving," of the Standard Specifications and these special provisions.

10-1.60 MISCELLANEOUS CONCRETE CONSTRUCTION

Minor concrete shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

Curb ramp detectable warning surface shall conform to the details shown on the plans and shall not be constructed or installed on curb ramps with a slope that exceeds 6.67 percent. The finished surfaces of the detectable warning surface shall be free from blemishes.

Curb ramp detectable warning surface shall consist of raised truncated domes constructed or installed on curb ramps. Detectable warning surface, at the option of the Contractor, shall be either cast-in-place or stamped into the surface of the curb ramp, or shall be a prefabricated surface installed on the curb ramp. The color of the detectable warning surface shall be yellow conforming to Federal Standard No. 595B, Color No. 33538. Detectable warning surface, either cast-in-place or stamped into the surface of the curb ramp, shall be painted yellow in conformance with the provisions in Section 59-6, "Painting Concrete," of the Standard Specifications.

Prior to constructing curb ramps with a cast-in-place or stamped detectable warning surface, a test panel shall be constructed on the project site and shall be of a size not less than 600 mm by 600 mm. The test panel shall be constructed, finished and cured with the same materials, tools, equipment, and methods to be used in constructing the proposed permanent work. Additional test panels shall be constructed as necessary until a panel is produced which demonstrates, to the satisfaction of the Engineer, the ability of the selected procedure to produce a detectable warning surface that meets all of the specified requirements.

Full compensation for constructing or installing a curb ramp detectable warning surface shall be considered as included in the contract price paid per cubic meter for minor concrete (curb ramp) and no separate payment will be made therefor.

10-1.61 MINOR CONCRETE (GUTTER)

The gutter behind the retaining wall shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

Minor concrete (gutter) will be measured and paid for by the linear meter.

The contract price paid per linear meter for minor concrete (gutter) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the gutter, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.62 MISCELLANEOUS IRON AND STEEL

Miscellaneous iron and steel shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

10-1.63 CHAIN LINK FENCE (TYPE CL-1.8, SLATTED)

Chain link fence (Type CL-1.8, slatted) consisting of chain link fence (Type CL-1.8) with wood or plastic slats inserted vertically in the chain link fabric shall conform to the provisions in Section 80, "Fences," of the Standard Specifications and these special provisions.

Chain link fence fabric shall be woven from 3.76 mm (9-gage) galvanized steel wire. Mesh openings in the chain link fence fabric shall be approximately 83 mm vertically and 133 mm horizontally.

Wood slats shall consist of clear redwood or light to medium weight wood produced by the species Shorea (Meranti). Wood slats shall be not less than 6 mm thick and approximately 60 mm wide with a length sufficient to fill the vertical opening of the fabric. The slats shall be inserted vertically in the mesh openings so that the slats fit snugly and shall be fastened in a manner to prevent easy removal or displacement.

Plastic slats shall be manufactured from a high density virgin polyethylene with ultraviolet inhibitors, shall be grey in color, and shall conform to the following:

- A. Plastic slats shall have a flat tubular cross section with a wall thickness of approximately 0.8-mm; depth of approximately 8.3 mm; width of approximately 60.5 mm; and a length equal to the designated fence height.
- B. The plastic slats shall have the following material specifications:

Property	Value	ASTM Designation
Melt Index	0.24	D 1238
Density	0.951	D 1505
Low Temperature Brittleness	-60°C	D 746
Tensile Strength	25.5 MPa	D 638

10-1.64 CHAIN LINK WALK GATE

Chain link walk gates shall be Type CL-1.8 conforming to the provisions in Section 80, "Fences," of the Standard Specifications and these special provisions.

Gates shall be installed in existing fences at the locations shown on the plans. Gate installations shall be complete with gate post, latch post, concrete footings, braces, truss rods, and hardware. Gate and latch posts shall be braced to the next existing line post as shown on the plans.

At each gate location, an existing line post shall be removed and the new gate installed so that the gate is centered on the post hole of the removed post. Holes resulting from the removal of line posts shall be backfilled.

Gate mounting and latching hardware shall not contain open-end slots for the fastening bolts.

Chain link fabric for gates shall be of the same mesh size as the existing fence in which the gates are installed.

Openings made in existing fences for installation of gates shall be closed during the working day in which the openings are made and when work is not in progress. Temporary closures shall be made with the existing fence fabric or with additional 1.83-m chain link fabric as directed by the Engineer.

Full compensation for making the openings in existing fences, for temporary closing of the openings (including furnishing additional fence fabric if necessary), and for new posts, footings, hardware, braces, and truss rods shall be considered as included in the contract unit price paid for 1.2-m chain link gate (Type CL-1.8) and no additional compensation will be allowed therefor.

10-1.65 MARKERS AND DELINEATORS

Markers and delineators shall conform to the provisions in Section 82, "Markers and Delineators," of the Standard Specifications and these special provisions.

Markers and delineators on flexible posts shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. Flexible posts shall be made from a flexible white plastic which shall be resistant to impact, ultraviolet light, ozone, and hydrocarbons. Flexible posts shall resist stiffening with age and shall be free of burns, discoloration, contamination, and other objectionable marks or defects which affect appearance or serviceability.

Retroreflective sheeting for metal and flexible target plates shall be the retroreflective sheeting designated for channelizers, markers, and delineators conforming to the requirements in ASTM Designation: D 4956-95 and in conformance with the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

10-1.66 METAL BEAM GUARD RAILING

Metal beam guard railing shall be constructed in conformance with the provisions in Section 83-1, "Railings," of the Standard Specifications and these special provisions.

Attention is directed to "Order of Work" of these special provisions.

Line posts and blocks shall be wood.

10-1.67 CHAIN LINK RAILING

Chain link railing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications and these special provisions.

10-1.68 CABLE RAILING

Cable railing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications.

10-1.69 CONCRETE BARRIER

Concrete barriers shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

If reinforcement is encountered during drilling, before the specified depth is attained, the Engineer shall be notified. Unless the Engineer approves coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

10-1.70 CONCRETE BARRIER (TYPE K)

Concrete barrier (Type K) shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

Concrete barrier (Type K) shall consist of precast units conforming to the provisions for temporary railing (Type K) in Section 12-3.08, "Temporary Railing (Type K)," of the Standard Specifications, except that removable panels shall not be used and the concrete barrier (Type K) shall remain in place at the completion of the contract.

Temporary railing (Type K) reflectors on concrete barrier (Type K) shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Full compensation for furnishing and installing temporary railing (Type K) reflectors on concrete barrier (Type K) shall be considered as included in the contract price paid per meter for concrete barrier (Type K) and no additional compensation will be allowed therefor.

10-1.71 CRASH CUSHION, SAND FILLED

Sand filled crash cushions shall be furnished and installed as shown on the plans and in conformance with these special provisions.

A sand filled crash cushion shall consist of a grouping of sand filled modules.

Crash cushions shall be installed at the locations as shown on the plans.

At the Contractor's option, modules for use in sand filled crash cushions shall be either Energite III Inertial Modules, Fitch Inertial Modules or Traffix Sand Barrels manufactured after March 31, 1997, or equal:

- A. Energite III and Fitch Inertial Modules, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076. Telephone 1-312-467-6750, FAX 1-800-770-6755
 - 1. Distributor (North): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828. Telephone 1-800-884-8274, FAX 1-916-387-9734
 - 2. Distributor (South): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805. Telephone 1-800-222-8274, FAX 1-714-937-1070
- B. Traffix Sand Barrels, manufactured by Traffix Devices, Inc., 220 Calle Pintoresco, San Clemente, CA 92672. Telephone 1-949 361-5663, FAX 1-949 361-9205
 - 1. Distributor (North): United Rentals, Inc., 1533 Berger Drive, San Jose, CA 95112. Telephone 1-408 287-4303, FAX 1-408 287-1929
 - 2. Distributor (North): Statewide Safety & Sign, Inc., P.O. Box 1440, Pismo Beach, CA 93448. Telephone 1-800-559-7080, FAX 1-805 929-5786

Modules contained in the crash cushion shall be of the same type at each location. The color of the modules shall be the standard yellow color as furnished by the vendor, with black lids. The exterior components of the modules shall be formulated or processed to resist deterioration from ambient ultraviolet rays. The modules shall exhibit good workmanship free from structural flaws and objectionable surface defects.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that the crash cushions comply with the contract plans and specifications, conform to the prequalified design and material requirements, and were manufactured in conformance with the approved quality control program.

Sand for filling the modules shall be clean washed concrete sand of commercial quality. At the time of placing in the modules, the sand shall contain not more than 7 percent water, as determined by California Test 226.

Modules placed on bridge decks shall be provided with positioning blocks fastened to the deck surface. Positioning blocks shall be shaped as segments of a ring and placed along the inner or outer periphery of the module wall. A minimum of 2 blocks, a minimum of one-sixth of a ring in length shall be provided for each module. Positioning blocks and fasteners shall be of a material that is corrosion and water resistant.

Module cylinders shall be filled with sand in conformance with the manufacturer's directions and to the sand capacity in kilograms for each module shown on the plans.

Lids shall be securely attached as recommended by the manufacturer.

A Type R or Type P marker panel shall be attached to the front of the crash cushion as shown on the plans, when the closest point of the crash cushion array is within 3.6 m of the traveled way. The marker panel, when required, shall be firmly fastened to the crash cushion with commercial quality hardware or by other methods approved by the Engineer.

Sand filled crash cushions, regardless of the number of modules required in each sand filled crash cushion, will be measured and paid for by the unit as crash cushion, sand filled. The quantity to be paid for will be determined from actual count of the units in place in the completed work.

The contract unit price paid for crash cushion, sand filled shall include full compensation for furnishing all labor, materials (including sand and marker panels), tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing crash cushions, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.72 THERMOPLASTIC PAVEMENT MARKING

Thermoplastic pavement markings shall be applied in conformance with the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

At the option of the Contractor, permanent traffic striping and pavement marking tape conforming to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be placed instead of the thermoplastic pavement markings specified herein. Permanent tape, if used, shall be installed in conformance with the manufacturer's specifications. If permanent tape is placed instead of thermoplastic pavement markings, the tape will be measured and paid by the square meter as thermoplastic pavement marking.

10-1.73 THERMOPLASTIC TRAFFIC STRIPE (SPRAYABLE)

Sprayable thermoplastic traffic stripes (traffic lines) shall be applied in conformance with the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

Sprayable thermoplastic material shall conform to the requirements of the Department of Transportation Specification PTH 392B, for Thermoplastic Traffic Striping Material, Sprayable, White and Yellow.

Sprayable thermoplastic material for traffic stripes shall be applied by spray methods in a single uniform layer at the minimum thickness of 1.0-mm.

Sprayable thermoplastic material shall be applied to the pavement at a temperature between 177°C and 205°C, unless a different temperature is recommended by the manufacturer.

At the option of the Contractor, permanent traffic striping and pavement marking tape conforming to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be placed instead of the sprayable thermoplastic traffic stripes specified herein. Permanent tape, if used, shall be installed in conformance with the manufacturer's specifications. If permanent tape is placed instead of sprayable thermoplastic traffic stripes, the tape will be measured and paid for by the meter as thermoplastic traffic stripe (sprayable).

Sprayable thermoplastic traffic stripes will be measured by the meter along the line of the traffic stripes, without deductions for gaps in broken traffic stripes. A double traffic stripe, consisting of two, 100 mm wide yellow stripes will be measured as one traffic stripe.

The contract price paid per meter for thermoplastic traffic stripe (sprayable) shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in applying sprayable thermoplastic traffic stripes (regardless of the number, widths, and patterns of individual stripes involved in each traffic stripe) including establishing alignment for stripes, and layout work, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.74 PAINT TRAFFIC STRIPE

Painted traffic stripes (traffic lines) shall be applied in conformance with the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

At the option of the Contractor, permanent traffic striping and pavement marking tape conforming to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be placed instead of the painted traffic specified herein. Permanent tape, if used, shall be installed in conformance with the manufacturer's specifications. If permanent tape is placed instead of painted traffic stripes, the tape will be measured and paid for by the meter as paint traffic stripe of the number of coats designated in the Engineer's Estimate.

10-1.75 PAVEMENT MARKERS

Pavement markers shall be placed in conformance with the provisions in Section 85, "Pavement Markers," of the Standard Specifications and these special provisions.

Attention is directed to "Traffic Control System For Lane Closure" of these special provisions regarding the use of moving lane closures during placement of pavement markers with bituminous adhesive.

Retroreflective pavement markers shall comply with the specific intensity provisions for reflectance after abrading the lens surface in conformance with the "Steel Wool Abrasion Procedure" specified for pavement markers placed in pavement recesses in Section 85-1.05, "Retroreflective Pavement Markers," of the Standard Specifications.

SECTION 10-2 HIGHWAY PLANTING AND IRRIGATION SYSTEMS

10-2.01 GENERAL

The work performed in connection with highway planting and irrigation systems shall conform to the provisions in Section 20, "Erosion Control and Highway Planting," of the Standard Specifications and these special provisions.

The Contractor shall notify the Engineer not less than 72 hours prior to requiring initial access to the existing irrigation controllers. When the Engineer determines that access to the controllers is required at other times, arrangements will be made to provide this access.

PROGRESS INSPECTIONS

Progress inspections will be performed by the Engineer for completed highway planting and irrigation system work at designated stages during the life of the contract.

Progress inspections will not relieve the Contractor of responsibility for installation in conformance with the special provisions, plans and Standard Specifications. Work within an area shall not progress beyond each stage until the inspection has been completed, corrective work has been performed, and the work is approved, unless otherwise permitted by the Engineer.

The requirements for progress inspections will not preclude additional inspections of work by the Engineer at other times during the life of the contract.

The Contractor shall notify the Engineer, in writing, at least 4 working days prior to completion of the work for each stage of an area and shall allow a minimum of 3 working days for the inspection.

Progress inspections will be performed at the following stages of work:

- A. During pressure testing of the pipelines on the supply side of control valves.
- B. During testing of low voltage conductors.
- C. Before planting begins and after completion of the work specified for planting in Section 20-4.03, "Preparing Planting Areas," of the Standard Specifications.
- D. Before plant establishment work begins and after completion of the work specified for planting in Section 20-4.05, "Planting," of the Standard Specifications.
- E. At intervals of one month during the plant establishment period.

COST BREAK-DOWN

The Contractor shall furnish the Engineer a cost break-down for the contract lump sum items of highway planting and irrigation system. Cost break-down tables shall be approved, in writing, by the Engineer before any partial payment will be made for the applicable items of highway planting and irrigation system involved.

Cost break-downs shall be completed and furnished in the format shown in the samples of the cost break-downs included in this section. Line item descriptions of work shown in the samples are the minimum to be submitted. Additional line item descriptions of work may be designated by the Contractor. If the Contractor elects to designate additional line item descriptions of work, the quantity, value and amount for those line items shall be completed in the same manner as for the unit descriptions shown in the samples. The line items and quantities given in the samples are to show the manner of preparing the cost break-downs to be furnished by the Contractor.

The Contractor shall determine the quantities required to complete the work shown on the plans. The quantities and their values shall be included in the cost break-downs submitted to the Engineer for approval, before 30 working days prior to the start of highway planting or irrigation systems work. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-downs submitted for approval.

The sum of the amounts for the line items of work listed in each cost break-down table for highway planting and for irrigation system work shall be equal to the contract lump sum price bid for Highway Planting and Irrigation System, respectively. Overhead and profit, shall be included in each individual line item of work listed in a cost break-down table.

No adjustment in compensation will be made in the contract lump sum prices paid for highway planting and irrigation system due to differences between the quantities shown in the cost break-downs furnished by the Contractor and the quantities required to complete the work as shown on the plans and as specified in these special provisions.

Individual line item values in the approved cost break-down tables will be used to determine partial payments during the progress of the work and as the basis for calculating an adjustment in compensation for the contract lump sum items of highway planting and irrigation system due to changes in line items of work ordered by the Engineer. When the total of ordered changes to line items of work increases or decreases the lump sum price bid for either Highway Planting or Irrigation System by more than 25 percent, the adjustment in compensation for the applicable lump sum item will be determined in the same manner specified for increases and decreases in the total pay quantity of an item of work in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.

HIGHWAY PLANTING COST BREAK-DOWN

Contract No. 08-334834

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
Roadside Clearing	LS	1		
Plant (Group A)	EA	1297		
Plant (Group B)	EA	153		
Plant (Group U)	EA	74		
Plant (Group H)	EA	31,683		
Plant (Group Z-1)	EA	8		
Plant (Group Z-2)	EA	25		
Plant (Group Z-3)	EA	28		
Plant (Group Z-4)	EA	9		
PREPARE HOLE (SOIL AMENDMENT)	EA	1,524		
Mulch	M3	448		
Commercial Fertilizer	Kg	2,568		

TOTAL

IRRIGATION SYSTEM COST BREAK-DOWN

Contract No. 08-334834

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
Control & Neutral Conductors	LS	1		
25 mm Electric Remote Control Valve	EA	20		
32 mm Electric Remote Control Valve	EA	2		
40 mm Electric Remote Control Valve	EA	6		
50 mm Electric Remote Control Valve	EA	4		
65 mm Galvanized Steel Pipe Supply Line (on slope paving)	M	15		
50 mm Sprinkler Control Conduit (on slope paving)	M	15		
20 mm Plastic Pipe (PR 200) (Supply Line)	M	1,650		
25 mm Plastic Pipe (PR 200) (Supply Line)	M	850		
32 mm Plastic Pipe (PR 200) (Supply Line)	M	200		
40 mm Plastic Pipe (PR 200) (Supply Line)	M	780		
50 mm Plastic Pipe (Schedule 40) (Supply Line)	M	480		
65 mm Plastic Pipe (PR 315) (Supply Line)	EA	515		
Sprinkler (Type A-5)	EA	49		
Sprinkler (Type A-6)	EA	16		
Sprinkler (Type A-7)	EA	15		
Sprinkler (Type A-8)	EA	21		
Sprinkler (Type B-2)	EA	55		
Sprinkler (Type B-6)	EA	87		
Sprinkler (Type C-2)	EA	324		
25 mm Gate Valve	EA	1		
32 mm Gate Valve	EA	1		
40 mm Gate Valve	EA	4		
50 mm Gate Valve	EA	5		
65 mm Gate Valve	EA	3		
25 mm Backflow Preventer Assembly	EA	4		
Back flow Preventer Assembly Enclosure	EA	4		
4 Station Solar Power Irrigation Controller	EA	2		
6 Station Solar Power Irrigation Controller	EA	2		
Irrigation Controller Enclosure Cabinet	EA	4		

TOTAL

MAINTAIN EXISTING PLANTED AREAS

Existing planted areas, that are not to be removed outside the limits of clearing and grubbing operations, shall be maintained throughout the life of the contract in conformance with these special provisions.

Existing plants shall be watered in conformance with the provisions in Section 20-4.06, "Watering," of the Standard Specifications.

Existing planted areas to be maintained shall be inspected for deficiencies by the Contractor in the presence of the Engineer. Deficiencies requiring corrective action shall include weeds; dead, diseased, or unhealthy plants; inadequate plant basins; and any other deficiencies needing corrective action to promote healthy plant life, as determined by the Engineer. The inspection shall be completed within 10 working days after the start of work.

When directed by the Engineer, deficiencies found during the inspection shall be corrected within 10 working days after the inspection. Correction of deficiencies, as directed by the Engineer, will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work," of the Standard Specifications.

When directed by the Engineer, existing plants shall be pruned and the work will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work," of the Standard Specifications.

After initial deficiencies have been corrected as directed by the Engineer, the Contractor shall continue to maintain existing planted areas as often as necessary to maintain the area in a neat appearance. The work shall include the following and any other work needed to promote healthy plant growth and maintain the area in a neat appearance, as determined by the Engineer.

- A. Weed growth shall be killed before the weeds reach the seed stage of growth or exceed 150 mm in length.
- B. Trash, debris and weeds shall be removed from existing planted areas. Weeds shall be killed prior to removal. Trash, debris and weed removal in ground cover areas shall extend beyond the outer limits of ground cover areas to the adjacent edges of paving, fences and proposed plants and planting areas, and a 2-m diameter area centered at each existing tree and shrub.
- C. Existing plant basins shall be kept well formed and free of silt. If existing plant basins require repairs, and the plant basins contain mulch, the mulch shall be replaced after the plant basins have been repaired.
- D. When a portion of a new automatic irrigation system is completed, the existing plants to be watered by that portion of the irrigation system shall be watered automatically.
- E. Pesticides for maintaining existing planted areas shall conform to the provisions in "Pesticides" of these special provisions.

If after completion of the initial inspection and correction of deficiencies, the Engineer determines that existing plants show signs of failure to grow, or are so injured or damaged as to render the plants unsuitable for the purpose intended, the existing plants shall be replaced. Removal, disposal and replacement of the existing plants shall be in conformance with the provisions in "Preservation of Property" of these special provisions.

Except as otherwise provided herein for payment by extra work, maintain existing planted areas will be paid for at the contract lump sum price for maintain existing plants.

REMOVE EXISTING PLANTS FOR TRENCHING

Removing existing plants for trenching shall conform to the provisions in Section 20-5.026, "Remove Existing Plants for Trenching," of the Standard Specifications and these special provisions.

Removing existing plants for trenching work shall consist of removing and replacing ground cover, pruning trees and shrubs within trench locations, and disposing of removed ground cover and prunings.

Replacement of removed ground cover within the maximum 1.8-m width, as specified in Section 20-5.026, "Remove Existing Plants for Trenching," of the Standard Specifications, will not be required.

Trees and shrubs adjacent to dikes, walks, fences, guard railing, and pavement edges may be pruned back 3 m from these facilities to facilitate trenching work. When trenching is to be performed adjacent to other trees and shrubs that cannot be avoided, the trees and shrubs may be pruned upon receipt of prior written approval of the Engineer.

Pruning shall include removal of deadwood, suckers, and broken or bruised branches 25 mm or larger in diameter. Pruning shall conform to the provisions in Section 20-4.055, "Pruning," of the Standard Specifications.

Removed ground cover and pruned materials shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. At the Contractor's option, removed ground cover and prunings may be reduced to chips. Chipped materials shall be spread within the highway right of way where designated by the Engineer.

Shrubs adjacent to dikes, fences, guard railing, and the edge of pavement within the 3-m pruned area designated above, that in the opinion of the Engineer should be removed after pruning, shall be removed and disposed of. Removing and disposing of the shrubs not otherwise provided for will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

10-2.02 TRANSPLANT EXISTING PALM TREES

Transplanting of existing palm trees shall conform to the provisions in Section 20-4, "Highway Planting," of the Standard Specifications and these special provisions.

Existing palm trees to be transplanted shall be removed and either stored or transplanted at the new locations prior to performing other work within the location of the existing palm trees.

When the palm trees are removed and the work within the areas to which the trees are to be transplanted is not completed to the stage at which the trees can be planted, the trees shall be stored and maintained until transplanting can be completed. In other cases, the palm trees shall be planted at the new locations the same day the palm trees are removed.

Transplanting palm trees shall be performed between March 15 and October 15 unless otherwise directed by the Engineer.

Before each palm tree is planted, dead fronds and frond stubs shall be removed from the trunk. In addition, green fronds shall be removed up to 2 rows of fronds away from the center growth. The 2 remaining rows of fronds shall be tied in an upright position with light hemp or manila rope. Fronds and frond stubs for *Phoenix dactylifera* (Date Palm) shall be removed approximately 100 mm from the trunk. Other fronds and frond stubs shall be removed at the trunk in a manner that will not injure the tree trunk.

The roots of each palm tree or clump of palm trees shall be balled in a manner approved by the Engineer. Approval shall be obtained before removing any palm tree to be transplanted. The diameter and depth of each root ball shall be a minimum of 200 mm larger than the trunk diameter at the ground line. Exposed root balls shall be kept covered with wet burlap or canvas until the trees are planted.

Holes resulting from the removal of transplanted palm trees shall be backfilled the same day the trees are removed. Soil from the surrounding area may be used to backfill the holes. The backfill shall be mounded slightly above the surrounding ground level.

Palm trees shall not be dragged during transplanting operations and the trunks shall be protected from injury.

Each planting hole shall conform to the details shown on the plans.

Commercial fertilizer (packet) shall be slow or controlled release and shall be in a biodegradable packet form. The packet shall gradually release nutrients over a 12-month period. Each packet shall have a mass of $10\text{ g} \pm 1\text{ g}$ and shall have the following guaranteed chemical analysis:

Ingredient	Percentage
Nitrogen	20
Phosphoric Acid	10
Water Soluble Potash	5

Backfill material for the palm tree planting holes shall be plaster sand.

After the planting holes have been backfilled, water shall be applied to the full depth of the backfill soil.

Watering basins for the transplanted palm trees shall be constructed as shown on the plans.

When the palm trees are planted, a root stimulant, approved by the Engineer, shall be applied to the roots of each palm tree in conformance with the printed instructions of the root stimulant manufacturer. A copy of the printed instructions shall be furnished to the Engineer before applying a stimulant. Root stimulant to be used shall be submitted to the Engineer not less than 2 weeks prior to the stimulant's intended use. Root stimulants not approved by the Engineer shall not be used.

Palm trees to be transplanted shall be maintained by the Contractor from the time the palm trees are removed to the time of acceptance of the contract. The palm trees shall be watered as necessary to maintain the trees in a healthy condition. Trash, debris and weeds within the basins, including the basin walls, shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. Weeds shall be removed before the weeds exceed 50 mm in length. Pesticides to be used for weed control shall be submitted to the Engineer not less than 2 weeks prior to the pesticide's intended use. Pesticides not approved by the Engineer shall not be used.

The provisions specified in Section 20-4.07, "Replacement," of the Standard Specifications for the replacement of unsuitable plants shall apply to transplanted palm trees. The replacement palm tree for each unsuitable transplanted palm tree shall be the same size and species as the palm tree being replaced. Each replacement palm tree shall be planted in the planting hole of the unsuitable palm tree which the new tree is replacing. The method for planting replacement palm trees shall be as specified in this section for transplanting palm trees. Removed unsuitable transplanted palm trees shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The quantity of transplant palm trees will be measured by the unit as determined from actual count in place.

The contract unit price paid for transplant palm tree shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in transplanting palm trees, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-2.03 PLANT PALM TREES

Before each palm tree is planted, dead fronds and frond stubs shall be removed from the trunk. The palm head including the apical bulb shall be saturated with a fungicide approved for use by the Engineer. Green fronds shall be removed up to 2 rows of fronds away from the center growth. The 2 remaining rows of fronds shall be tied in an upright position with light hemp or manila rope.

Palm trees shall not be dragged during planting operations and the trunks shall be protected from injury.

Planting hole shall conform to the details shown on the plans.

Commercial fertilizer (packet) shall be slow or controlled release and shall be in a biodegradable packet form. The packet shall gradually release nutrients over a 12-month period. Each packet shall have a mass of $10 \text{ g} \pm 1 \text{ g}$ and shall have the following guaranteed chemical analysis:

Ingredient	Percentage
Nitrogen	20
Phosphoric Acid	10
Water Soluble Potash	5

Backfill material shall be plaster sand.

When the palm trees are planted, a root stimulant, approved by the Engineer, shall be applied to the roots of each palm tree in conformance with the printed instructions of the root stimulant manufacturer. A copy of the printed instructions shall be furnished to the Engineer before applying a stimulant. Root stimulant to be used shall be submitted to the Engineer not less than 2 weeks prior to the stimulant's intended use. Root stimulants not approved by the Engineer shall not be used.

10-2.04 EXISTING HIGHWAY IRRIGATION FACILITIES

Water shall be maintained in conformance with the provisions in Section 20-5.025, "Maintain Existing Water Supply," of the Standard Specifications.

CHECK AND TEST EXISTING IRRIGATION FACILITIES

Existing irrigation facilities that are to remain or to be relocated, and that are within those areas where clearing and grubbing or earthwork operations are to be performed, shall be checked for missing or damaged components and proper operation prior to performing clearing and grubbing or earthwork operations. Existing irrigation facilities outside of work areas that are affected by the construction work shall also be checked for proper operation.

CHECK AND TEST EXISTING IRRIGATION FACILITIES

Deficiencies found during checking of the existing facilities shall be corrected as directed by the Engineer. Corrective work ordered by the Engineer will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Existing backflow preventers shall be tested in conformance with the provisions in "Irrigation Systems" of these special provisions.

Length of watering cycles for use of potable water from water meters for checking or testing existing irrigation facilities shall be as determined by the Engineer.

Repairs to the existing irrigation facilities ordered by the Engineer after checking and testing the facilities, and further repairs required thereafter as ordered by the Engineer, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

REMOVE EXISTING IRRIGATION FACILITIES

Existing irrigation facilities where shown on the plans to be removed, shall be removed. Facilities that are more than 150 mm below finished grade, may be abandoned in place.

Immediately after disconnecting an existing irrigation facility to be removed or abandoned from an existing facility to remain, the remaining facility shall be capped or plugged, or shall be connected to a new or existing irrigation facility.

Facilities to be removed, shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

10-2.05 HIGHWAY PLANTING

The work performed in connection with highway planting shall conform to the provisions in Section 20-4, "Highway Planting," of the Standard Specifications and these special provisions.

HIGHWAY PLANTING MATERIALS

Mulch (Green Material)

Mulch shall be colored wood chips and shall be 75 mm or less in size, made from chipped recycled fir wood, and shall be colored red with a long lasting, non-toxic mineral dye.

Commercial Fertilizer (Granular)

Commercial fertilizer (granular) shall be a pelleted or granular form and shall fall within 20 percent of the following guaranteed chemical analysis:

Ingredient	Percentage
Nitrogen	
Phosphoric Acid	
Water Soluble Potash	

Commercial Fertilizer (Slow Release)

Commercial fertilizer (slow release) shall be a pelleted or granular form, shall be slow or controlled release with a nutrient release over an 8- to 12-month period, and shall fall within the following guaranteed chemical analysis range:

Ingredient	Percentage
Nitrogen	16-21
Phosphoric Acid	6-8
Water Soluble Potash	4-10

Commercial Fertilizer (Packets)

ROADSIDE CLEARING

Within 30 days prior to preparing rock blanket (Type 1) and planting areas, trash and debris shall be removed from within the limits of those areas.

In addition to removing trash and debris, the project area shall be cleared as specified herein:

- A. Weeds shall be killed and removed within proposed ground cover areas and within the area extending beyond the outer limits of the proposed ground cover areas to the adjacent edges of shoulders, dikes, curbs, sidewalks, walls, existing planting and fences. At those locations where proposed ground cover areas are 3.6 m or more from the adjacent edges of shoulders, dikes, curbs, sidewalks, walls, and fences, the clearing limit shall be 2 m beyond the outer limits of the proposed ground cover areas.
- B. Weeds shall be killed and removed within planting areas where plants are to be planted in groups or rows 4.6 m or less apart and from within an area extending 2 m beyond the outer limits of the groups or rows of plants.
- C. Weeds shall be killed and removed within an area 2 m in diameter centered at each plant location where the plants are to be planted more than 4.6 m apart and are located outside of ground cover areas.

After the initial roadside clearing is complete, additional roadside clearing work shall be performed as necessary to maintain the areas, as specified above, in a neat appearance until the start of the plant establishment period. This work shall include the following:

- A. Trash and debris shall be removed.
- B. Weed growth shall be killed before the weeds reach the seed stage of growth or exceed 75 mm in length, except for weeds in wild flower seeding areas to be mowed.

Weed Control

Weed control shall also conform to the following:

- A. Stolon type weeds shall be killed with glyphosate.
- B. Tumbleweeds shall be removed by hand pulling before the tumbleweeds reach a height of 75 mm.
- C. Removed weeds shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

D. Roadside clearing work shall not include work required to be performed as clearing and grubbing as specified in Section 16, "Clearing and Grubbing," of the Standard Specifications.

PESTICIDES

Pesticides used to control weeds shall conform to the provisions in Section 20-4.026, "Pesticides," of the Standard Specifications. Except as otherwise provided in these special provisions, pesticide use shall be limited to the following materials:

Cacodylic Acid
Diquat
Fluazifop-butyl
Glyphosate
Isoxaben (Preemergent)
Sethoxydim
Oxadiazon - 50 percent WP (Preemergent)
Oryzalin (Preemergent)
Pendimethalin (Preemergent)
Prodiamine (Preemergent)
Trifluralin (Preemergent)
Ammonium Sulfate
Magnesium Chloride
Melfluidide (Growth regulator)
Napropamide (Preemergent)

Granular preemergents may be used when applied to areas that will be covered with mulch, excluding plant basins. Granular preemergents shall be limited to the following materials:

Dichlobenil (Preemergent)
Oxadiazon (Preemergent)

Granular preemergents shall be applied prior to the application of mulch. Mulch applications shall be completed in these areas on the same working day. Photosensitive dye will not be required.

Glyphosate shall be used to kill stolon type weeds.

Oxadiazon shall be of the emulsifiable concentration or wettable powder type, except when Oxadiazon is used under mulch in conformance with these special provisions.

A minimum of 100 days shall elapse between applications of preemergents.

Ammonium sulfate and magnesium chloride shall be used only in areas planted to *Carpobrotus* or *Delosperma*. Ammonium sulfate and magnesium chloride shall not be applied in a manner that allows the pesticides to come in contact with trees or shrubs.

If the Contractor elects to request the use of other pesticides on this project, the request shall be submitted, in writing, to the Engineer not less than 15 days prior to the intended use of the other pesticides. Except for the pesticides listed in these special provisions, no pesticides shall be used or applied without prior written approval of the Engineer.

Pesticides shall not be applied in a manner that allows the pesticides to come in contact with the foliage and woody parts of the plants.

PREPARE HOLES

Holes for plants shall be excavated to the minimum dimensions shown on the plans.

Plant holes shall be excavated by drilling and shall have the sides of the holes scarified to 50 mm.

Backfill material for plant holes shall be a mixture of soil and other materials shown on the Plant List. Backfill material shall be thoroughly mixed and uniformly distributed throughout the entire depth of the plant hole without clods and lumps.

CULTIVATE

Areas to be planted with Plant Groups "H" and "F" shall be cultivated.

Immediately prior to cultivation, soil amendment and commercial fertilizer shall be added to the areas to be cultivated. Soil amendment shall be added at the rate shown on the plans and commercial fertilizer shall be applied at the rate of 7.5 kilograms per 100 square meters. Soil amendment and fertilizer shall be thoroughly mixed with the soil.

Unless payment is made separately in these special provisions, full compensation for performing cultivation, weed germination, killing of weeds that germinate, and for furnishing and mixing soil amendment and fertilizer shall be considered as included in the contract unit prices paid for the plants involved and no separate payment will be made therefor.

PLANTING

Commercial fertilizer and iron sulfate shall be applied or placed at the time of planting and at the rates shown on the plans.

A granular preemergent shall be applied to areas to be covered with mulch outside of plant basins in conformance with the provisions in "Pesticides" of these special provisions.

Mulch placed in areas outside of plant basins shall be spread to a uniform depth of ___ mm.

Mulch shall not be placed within one meter of the center line of earthen drainage ditches, within one meter of the edge of paved ditches, and within one meter of the center line of drainage flow lines.

Attention is directed to "Irrigation Systems Functional Test" of these special provisions regarding functional tests of the irrigation systems. Planting shall not be performed in an area until the functional test has been completed for the irrigation system serving that area.

PLANT ESTABLISHMENT WORK

The plant establishment period shall be Type 2 and shall not be less than 125 working days.

Attention is directed to "Relief From Maintenance and Responsibility" in these special provisions regarding relief from maintenance and protection.

Two applications of commercial fertilizer (slow release) shall be applied to trees, shrubs, vines and ground cover, when directed by the Engineer. Commercial fertilizer shall be applied at the rates shown on the plans and shall be spread with a mechanical spreader wherever possible.

The center to center spacing of replacement plants for unsuitable ground cover plants shall be the original spacing.

Weeds within the areas specified under roadside clearing shall be controlled by killing before the weeds reach a seed stage of growth or exceed 75 mm in length.

At the option of the Contractor, plants of a larger container size than those originally specified may be used for replacement plants during the first 125 working days of the plant establishment period. The use of plants of a larger container size than those originally specified for replacement plants shall be at the Contractor's expense.

The final inspection shall be performed in conformance with the provisions in Section 5-1.13, "Final Inspection," of the Standard Specifications and shall be completed a minimum of 20 working days before the estimated completion of the contract.

10-2.06 IRRIGATION SYSTEMS

Irrigation systems shall be furnished and installed in conformance with the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications, except materials containing asbestos fibers shall not be used.

PIPE AND CONDUIT ANCHORS

Anchors used to attach galvanized steel pipe supply lines and sprinkler control conduits (electrical conduits) to the exterior surfaces of concrete structures and walls shall consist of metal straps and anchoring devices. Metal straps shall be made of steel and shall be fabricated to the details and dimensions shown on the plans. Anchoring devices shall consist of resin capsule anchor bolts or mechanical expansion stud anchors. Anchors shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

When galvanized steel pipe supply lines and conduits are installed vertically on a structure for a distance of 0.6-m or more, but less than 3 m, an anchor shall be installed at the top and bottom of the pipe within 150 mm of the elbows. Vertical distances of 3 m or more shall have anchors installed at 3 m on centers unless otherwise shown on the plans. Anchors used to support vertically installed pipe and conduit shall be installed as shown on the plans.

Holes for anchorage devices shall conform to the following:

- A. Holes shall not be drilled closer than 150 mm to the edge of a concrete structure.
- B. Holes shall be drilled with drills approved by the Engineer.
- C. Holes shall be relocated if reinforcing steel is encountered. Abandoned holes shall be filled with portland cement concrete mortar conforming to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications.
- D. Holes shall be drilled to a minimum depth of 8 times the diameter of the anchor bolt or stud anchor.

VALVE BOXES

Valve boxes shall conform to the provisions in Section 20-2.24, "Valve Boxes," of the Standard Specifications, except as otherwise provided herein.

Valve boxes shall be precast portland cement concrete.

Covers for concrete valve boxes shall be glass fiber reinforced plastic, plastic, concrete, cast iron or steel. Cast iron and steel covers shall be hinged with brass hinge pins for valve boxes containing valves smaller than 50 mm.

Valve boxes shall be identified on the top surface of the covers by branding the appropriate abbreviations for the irrigation facilities contained in the valve boxes as shown on the plans. Valve boxes that contain remote control valves shall be identified by the appropriate letters and numbers (controller and station numbers). The letters and numbers shall be 50 mm in height.

Valve boxes shall be identified on the top surface of the covers by labels containing the appropriate abbreviation for the irrigation facility contained in the valve box as shown on the plans. Valve boxes that contain remote control valves shall be identified by the appropriate letters and numbers (controller and station numbers). Labels for valve boxes shall conform to the provisions in Section 20-5.03F, "Valves and Valve Boxes," of the Standard Specifications.

Label material shall be plate plastic.

ELECTRIC AUTOMATIC IRRIGATION COMPONENTS

Irrigation Controllers

Solar Irrigation controllers shall be single, solid-state independent controllers conforming to the following:

- A. Irrigation controllers shall operate on a photovoltaic power system computer with a lockable waterproof vandal resistant case, and shall be manufactured as one complete unit.
- B. Power shall be available for continuous 24-hour operation at a minimum light equivalent of 25 percent of ambient light at 55 degree latitude .
- C. The computer liquid-crystal display shall be powered by a 9-volt battery key mechanism.
- D. The irrigation controller shall have an output digital control pulse at 3.5-volts which will operate a valve solenoid within a 300 meter distance.
- E. The irrigation controller shall be fully automatic and capable of operating a complete one day to 90 day cycle, scheduling of up to 32 totally independent programs, with each having its own start time, day cycle, assigned stations, duration, and program time. Each station shall be capable of 1 minute to 24 hour operation in one minute increments and shall have separate settings for hours and minutes.
- F. The Irrigation controller shall have an emergency program backup system with a user-defined fail-safe program and system parameter which are stored in a non-erasable memory.
- G. The Irrigation controllers shall be installed as shown on the plans in accordance with the manufacturer's specifications.
- H. The watering time of each station shall be displayed on the face of the control panel.

Irrigation Controller Enclosure Cabinet

The Irrigation controllers shall be enclosed in stainless steel enclosure cabinets with inside mounted hinges and an inside mounting clamp. The Enclosure shall be equipped with a stainless steel lock. Prior to acceptance of the contract, 2 keys shall be delivered to the Engineer. The enclosure top cover shall be a poly carbonate product, shall be highly resistant to crazing, staining, discoloration, creep, warping, and long range deleterious effects of vehicle fumes, direct sunlight, heat (up to 90 Degree Centigrade), water, oils, and aging. The enclosure cover shall allow sufficient ambient light into the enclosure to operate the controller.

Electric Remote Control Valves

Electric remote control valves shall conform to the provisions in Section 20-2.23, "Control Valves," of the Standard Specifications and the following:

- A. Valves shall be brass, or cast iron construction.
- B. Valves shall be straight pattern (side inlet) as shown on the plans.
- C. Valves solenoids for (solar) controllers shall be DC latching and operate on 3.5 V and shall be compatible with the irrigation controller.
- D. Valve shall be provided with a factory installed filter-cleaning devices.
- E. Valve shall be equipped with an internal manual bleed.

Pull Boxes

Pull box installations shall conform to the provisions in Section 20-5.027I, "Conductors, Electrical Conduits and Pull Boxes," of the Standard Specifications.

Conductors

Low voltage, as used in this section "Conductors," shall mean 36 V or less. Conductors shall be a minimum number 14 size wire.

Low voltage control and neutral conductors in pull boxes and valve boxes, at irrigation controller terminals, and at splices shall be marked with adhesive cloth wrap-around markers.

Low voltage control and neutral conductors in pull boxes and valve boxes, at irrigation controller terminals, and at splices shall be marked as follows:

- A. Conductor terminations and splices shall be marked with adhesive backed paper markers or adhesive cloth wrap-around markers, with clear, heat-shrinkable sleeves sealed over the markers.

Markers for the control conductors shall be identified with the appropriate number or letter designations of irrigation controllers and station numbers. Markers for neutral conductors shall be identified with the appropriate number or letter designations of the irrigation controllers.

The color of low voltage neutral and control conductor insulation shall be homogeneous throughout the entire thickness of the insulation.

Insulation for conductors may be UL listed polyethylene conforming to UL44 test standards with a minimum insulation thickness of 1.05 mm for wire sizes 10AWG and smaller.

Type "C", Type "S" or Type "T" splices shall be used. Splices for low voltage control and neutral conductors shall conform to provisions in Section 86-2.09 C, "Connectors and Terminals," 86-2.09D, "Splicing," and 86-2.09E, "Splice Insulation", of the Standard Specifications, except Type "S" splice shall be soldered.

ARMOR-CLAD CONDUCTORS

Armor-clad conductors shall be used in direct burial applications from pull boxes adjacent to irrigation controller enclosure cabinets to the remote control valves and other irrigation facilities in conformance with the details shown on the plans and these special provisions.

Armor-clad conductors shall conform to the following:

- A. Conductors shall be the proper size for the application, and shall be solid, uncoated copper with a conductor size of not less than 90 percent of the AWG diameter required.
- B. Conductor insulation coverings shall be manufactured of polyvinyl chloride (PVC) conforming to UL style, Type UF 60°C, 600 V. Average thickness of insulation shall be not less than 1.52 mm with a minimum thickness of 1.37 mm at any one point.
- C. Armor shall be a minimum of 0.13-mm thick by 12.7 mm wide, Type 304 stainless steel tape that is helically wrapped over each conductor with a 33 percent minimum overlap.
- D. Outer jacket for conductors shall be sunlight resistant PVC and shall conform to the Insulated Power Cable Engineer's Association (ICEA) S-61-402, NEMA Standard WC5, and UL Listing 1263. Nominal thickness of the outer jacket shall be 0.76-mm with a minimum thickness of 0.61 mm at any one point.

Nonarmor-clad conductors conforming to the provisions in Section 20-2.31D, "Conductors," of the Standard Specifications shall be used in lieu of armor-clad conductors when the conductors are installed in an electrical conduit.

IRRIGATION SYSTEMS FUNCTIONAL TEST

Functional tests for the irrigation controllers and associated automatic irrigation systems shall conform to the provisions in Section 20-5.027J, "Testing," of the Standard Specifications and these special provisions.

Tests shall demonstrate to the Engineer, through one complete cycle of the irrigation controllers in the automatic mode, that the associated automatic components of the irrigation systems operate properly. If automatic components of the irrigation systems fail a functional test, these components shall be repaired at the Contractor's expense and the testing repeated until satisfactory operation is obtained.

Associated automatic components shall include, but not be limited , remote control valves.

Upon completion of work on an irrigation system, including correction of deficiencies and satisfactory functional tests for the systems involved, the plants to be planted in the area watered by the irrigation system may be planted provided the planting areas have been prepared as specified in these special provisions.

PIPE

Plastic Pipe

Plastic pipe supply lines shall be polyvinyl chloride (PVC) 1120 or 1220 pressure rated pipe with the minimum pressure rating of (PR200).

Plastic pipe supply lines and fittings that are 50 mm in diameter shall be schedule 40 pipe and shall conform to the requirements of ASTM designation 1785.

Plastic pipe supply lines that are 65 mm in diameter shall be (PR) 315 pressure rate pipe. Plastic pipe supply lines shall have solvent cemented type joints. Primers shall be used on the solvent cemented type joints.

Plastic pipe (irrigation lines) shall be installed not less than 300 mm below the finished grade, measured to the top of the pipe.

Fittings for plastic pipe supply lines with a pressure rating (PR) of 315 shall be Schedule 80.

WATER METER

Water meters for the irrigation systems will be furnished and installed by the serving utility at the locations shown on the plans.

Upon receipt of a written request from the Contractor, the Engineer will make arrangements with the serving utility to install the water meters. The State will pay the costs and fees charged by the serving utility for the installations.

BACKFLOW PREVENTER ASSEMBLIES

Backflow preventers shall conform to the provisions in Section 20-2.25, "Backflow Preventers," of the Standard Specifications and these special provisions.

Pressure loss through the backflow preventers shall not exceed the following:

BACKFLOW PREVENTER SIZE (millimeters)	FLOW RATE (Liters per minute)	PRESSURE LOSS (kPa)
40	190	82

Backflow preventer assemblies shall be painted with a minimum of 2 applications of a commercial quality enamel paint. The color of the paint shall be light brown.

BACKFLOW PREVENTER ASSEMBLY ENCLOSURE

Enclosures shall be fabricated of structural steel angles and flattened expanded metal and shall be installed over backflow preventer assemblies on a portland cement concrete pad as shown on the plans and in conformance with these special provisions.

Expanded metal for sides, ends and top panels shall be fabricated from 1.9 mm (14-gage), minimum thickness, sheet steel. The flattened expanded metal openings shall be approximately 20 mm by 45 mm in size.

Expanded metal panels shall be attached to the steel frames by a series of welds, not less than 6.4 mm in length and spaced not more than 100 mm on centers, along the edges of the enclosure.

Enclosure door handles shall have provisions for padlocking in the latched position. Padlocks will be State-furnished. Attention is directed to "State-furnished Materials" of these special provisions.

Enclosures shall be galvanized, after fabrication, in conformance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications.

Concrete for the concrete pad shall conform to the provisions in Section 20-2.26, "Concrete," of the Standard Specifications.

Hold down bolt assemblies shall be galvanized and shall be installed when the portland cement concrete pad is still plastic. Nuts shall be hexagonal and washers shall be the lock type.

Enclosures shall be painted with one application of a commercial quality pre-treatment, vinyl wash primer and a minimum of one application of a commercial quality, exterior enamel for metal. The finish color shall be light brown.

All parts of the backflow preventer assembly enclosure, including hold down assemblies, may be constructed of stainless steel instead of standard steel materials specified above. Stainless steel enclosures shall conform to the provisions herein except galvanizing, priming and painting shall not be required. Stainless steel enclosures shall be powder coated a light brown color by the manufacturer.

The minimum clearance between the backflow preventer assembly and the backflow preventer assembly enclosure shall be 50 mm. The concrete pad shall extend a minimum of 50 mm beyond the outer limits of the backflow preventer assembly enclosure, unless otherwise shown on the plans or specified in these special provisions.

TESTING BACKFLOW PREVENTERS

New backflow preventers installed by the Contractor and existing backflow preventers to remain in place shall be tested for proper operation in conformance with the provisions in Section 20-5.03J, "Check and Test Backflow Preventers," of the Standard Specifications and these special provisions.

Tests for new backflow preventers shall be satisfactorily completed after installation of the backflow preventer assembly and before operation of the irrigation systems. Existing backflow preventers shall be tested, and repaired if required, when existing irrigation facilities are checked.

Repair of existing backflow preventers will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications when ordered by the Engineer, except damage caused by the Contractor's operations.

Retesting of backflow preventers after satisfactory completion of the first tests will not be required.

Testing existing backflow preventers will be paid for in conformance with the provisions in "Checking and Testing Existing Irrigation Facilities" of these special provisions.

SPRINKLERS

Sprinklers shall conform to the type, pattern, material, and operating characteristics listed in the "Sprinkler Schedule" shown on the plans.

FINAL IRRIGATION SYSTEM CHECK

A final check of existing and new irrigation facilities shall be performed not more than 20 working days prior to acceptance of the contract.

The length of watering cycles using potable water measured by water meters for the final check of irrigation facilities will be determined by the Engineer.

Remote control valves connected to existing and new irrigation controllers shall be checked for automatic performance when the controllers are in automatic mode.

Unsatisfactory performance of irrigation facilities installed or modified by the Contractor shall be repaired and rechecked at the Contractor's expense until satisfactory performance is obtained, as determined by the Engineer.

Repair or replacement of existing irrigation facilities due to unsatisfactory performance shall conform to the provisions in "Existing Highway Irrigation Facilities" of these special provisions.

Nothing in this section "Final Irrigation System Check" shall relieve the Contractor of full responsibility for making good or repairing defective work or materials found before the formal written acceptance of the entire contract by the Director.

SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

10-3.01 DESCRIPTION

Modifying traffic signals, lighting, sign illumination, ramp metering system, fiber optic system and communication hub assembly shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

Lighting equipment is included in the following structures:

- A. University Avenue Undercrossing (Bridge No. 56-01314)
- B. Mission Inn Avenue Undercrossing (Bridge No. 56-0315)
- C. Spruce Street Overcrossing (Bridge No. 56-0318)

Communication conduit is included in the following structures:

- A. University Avenue Undercrossing (Bridge No. 56-01314)
- B. Mission Inn Avenue Undercrossing (Bridge No. 56-0315)
- C. Third Street Undercrossing (Bridge No. 56-0316)

Conduit for future irrigation is included in the following structure:

- A. Spruce Street Overcrossing (Bridge No. 56-0318)

Traffic signal work shall be performed at the following locations:

- A. Location 1: University Avenue and Mulberry Street
- B. Location 2: Mission Inn Avenue and Route 91 Eastbound Entrance / Westbound Exit Ramps.
- C. Location 3: Main Street and Route 60 Eastbound Entrance / Exit Ramps.
- D. Location 4: Main Street and Westbound Entrance Ramp.

10-3.02 COST BREAK-DOWN

Cost break-downs shall conform to the provisions in Section 86-1.03, "Cost Break-Down," of the Standard Specifications and these special provisions.

The Engineer shall be furnished a cost break-down for each contract lump sum item of work described in this Section 10-3.

The cost break-down shall be submitted to the Engineer for approval within 15 days after the contract has been approved. The cost break-down shall be approved, in writing, by the Engineer before any partial payment for the items of electrical work will be made.

The cost breakdown shall include the following items in addition to those listed in the Standard Specifications:

- A. Fiber optic cables-each size and type.
- B. Asynchronous Fiber Optic Modems.
- C. RS-232 Serial Cables.
- D. Fiber Optic Splice Vault
- E. Innerduct

10-3.03 MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS

Traffic signal system shutdowns shall be limited to periods between the hours of 9 a.m. and 3 p.m.

10-3.04 FOUNDATIONS

Reinforced cast-in-drilled-hole concrete pile foundations for traffic signal and lighting standards shall conform to the provisions in "Piling" of these special provisions.

10-3.05 STANDARDS, STEEL PEDESTALS AND POSTS

Standards, steel pedestals and posts for traffic signal and lighting standards shall conform to the provisions in "Steel Structures" of these special provisions.

Where the plans refer to the side tenon detail at the end of the signal mast arm, the applicable tip tenon detail may be substituted.

The sign mounting hardware shall be installed at the locations shown on the plans.

The sign panels will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

Mast arm mounted street name signs shall be installed on signal mast arms at the locations shown on the plans. The street name signs (except straps, seals and saddle brackets) will be State-furnished in conformance with the provisions in "Materials" of these special provisions. The hanger assembly will be similar to that shown for internally illuminated street name signs. The mounting hardware and sign shall be assembled. The assembly shall be attached to the mast arm using a 19 mm x 0.53 mm stainless steel strap in a manner similar to the strap and saddle bracket method shown on the plans. The band shall be wrapped at least twice around the mast arm, tightened, and secured with a stainless strap seal in the same manner shown for strap and saddle bracket sign mounting. Straps, seals and saddle brackets shall be furnished by the Contractor. The sign panel shall be leveled and hardware securely tightened.

Type 1 standards shall be assembled and set with the handhole on the downstream side of the pole in relation to traffic or as shown on the plans.

All ferrous metal parts of tubular sign structures shall be galvanized and shall not be painted.

10-3.06 CONDUIT

Conduit to be installed underground shall be Type 1 unless otherwise specified. Detector termination conduits shall be Type 3.

The conduit in a foundation and between a foundation and the nearest pull box shall be Type 1.

Conduit sizes shown on the plans and specified in the Standard Specifications and these special provisions are referenced to metallic type conduit. When rigid non-metallic conduit is required or allowed, the nominal equivalent industry size shall be used as shown in the following table:

Size Designation for Metallic Type Conduit	Equivalent Size for Rigid Non-metallic Conduit
21	20
27	25
41	40
53	50
63	65
78	75
103	100

After conductors have been installed, the ends of conduits terminating in pull boxes, service equipment enclosures, and controller cabinets shall be sealed with an approved type of sealing compound.

At those locations where conduit is required to be installed under pavement and existing underground facilities require special precautions in conformance with the provisions in "Obstructions" of these special provisions, conduit shall be placed by the "Trenching in Pavement Method" in conformance with the provisions in Section 86-2.05C, "Installation," of the Standard Specifications.

At other locations where conduit is required to be installed under pavement and if a delay to vehicles will not exceed 5 minutes, conduit may be installed by the "Trenching in Pavement Method."

FIBER OPTIC CONDUIT

Fiber optic conduit is defined as conduit that will contain innerduct and/or fiber optic cable, as shown on the plans. Furnishing and installing fiber optic conduit shall conform to the provisions for other conduits, and the following.

All fiber optic conduit shall be either Type 1 or Type 3.

Conduit trenches in or adjacent to paved shoulders shall be backfilled within 3 calendar days. Conduit trenches in and across traffic lanes shall be backfilled during the same work period the trench is excavated except that the top 300 mm of asphalt shall be placed within 3 calendar days.

Type 1 conduit shall be used for conduit attached to the exterior of a bridge or for conduit between a bridge and an adjacent splice vault and for conduit installed under freeway entrance and exit ramps.

Direct coupling of Type 1 to Type 3 fiber optic conduit will be permitted at underground locations by means of an industry standard rigid non-metallic conduit coupling. The coupling shall be the type for joining threaded conduit to solvent welded conduit.

Type 1 conduit shall be used for fiber optic conduit bends, except when using conduit with integral innerduct. Minimum conduit bend radius shall be 10 times trade diameter.

When fiber optic conduit is placed in a trench, that is not in a pavement area, the trench shall be backfilled with commercial quality colored concrete, as described elsewhere in these special provisions, containing not less than 250 kg of portland cement per cubic meter, to the dimensions shown on the plans. The trench shall be wide enough for a minimum of 25 mm of concrete between the wall of the trench and the side of the conduit.

Concrete used to backfill trenches shall have a 24-hour curing period. The trenches shall have barricades with "Open Trench" signs posted at the beginning of the trench and every 60 m.

Conduit shown on the plans to be installed either by trench in pavement or jacking will be paid for as trench in pavement regardless of which method is used.

All jacked conduit shall be Type 1. No trenching shall be allowed across freeways and ramps.

Immediately prior to installing cables and innerduct, conduit shall be blown out with compressed air until all foreign material is removed.

After conductors and cables and innerduct have been installed, the ends of conduits and innerduct shall be sealed with an approved type of conduit sealing plug.

MULTIDUCT CONDUIT

Where Size 103 conduit with innerduct is to be installed by trenching, a factory assembled conduit system with four innerducts will be allowed.

The conduit shall be Schedule 40 PVC. Each innerduct shall be Size 25(25 mm I.D. nominal), manufactured from polyethylene or PVC. Each innerduct shall be a different color and shall be consistent for the project. UL listing is not required.

Polyethylene innerduct shall conform to the special provisions described under "INNERDUCTS" and have longitudinally ribbed, with a minimum wall thickness of 1.9 mm.

PVC innerduct shall have a minimum wall thickness of 2.2 mm.

Straight segments of multiduct conduit shall be nominal 6.1 m lengths with a minimum 125 mm slip joint. Joints shall be keyed to mate the enclosed innerducts and shall lock together or be provided with a seating mark to verify proper assembly. The joint shall be solvent welded or sealed with a gasket as recommended by the manufacturer. Factory manufactured end sections shall be provided.

Bends shall be rigid factory assembled sections or shall be formed from factory assembled flexible sections, designed to fit the system.

Prior to joining the last sections of the conduit run, the innerduct colors at the ends shall be verified to be consistent.

10-3.07 CONDUIT AND INNERDUCT SEALING PLUGS

Except as otherwise noted, all fiber optic conduits and innerducts shall have their ends sealed with commercial preformed plugs which prevent the passage of gas, dust and water into these conduits and their included innerducts. Sealing plugs shall be installed within each splice vault, cabinet, or building.

Sealing plugs shall be removable and reusable. Plugs sealing innerducts, conductor or cable shall be the split type that permits installation or removal without removing conductors or cables.

Sealing plugs that seal between the Size 103 fiber optic conduit and innerducts shall seal the conduit and all innerducts simultaneously with one self contained assembly having an adjustable resilient filler of polyurethane elastomer clamped between backing ends and compressed with stainless steel hardware.

Sealing plugs that seal the innerducts shall seal each innerduct individually with appropriate sizes and configuration to accommodate either empty ducts or those containing fiber optic cable. To provide suitable sealing between the varying size cables and the plugs, split polyurethane elastomer adapting sleeves, used singularly or in multiples, shall be inserted within the body of the plugs.

Sealing plugs used to seal Size 103 fiber optic conduit and innerducts shall be capable of withstanding a pressure of 34.5 kPa.

A sealing plug that seals an empty conduit or innerduct shall have an eye or other type of capturing device (on the side of the plug that enters the conduit) to attach onto the pull tape, so the pull tape will be easily accessible when the plug is removed.

10-3.08 TRACER WIRE

Tracer wire shall be provided and placed in conduits containing fiber optic cable as shown on plans. Tracer wire shall be a No. 12, minimum, solid copper conductor with Type TW, THW, RHW, or USE insulation. The tracer wire shall form a mechanically and electrically continuous line throughout the length of the trench. A minimum of 1 m of slack shall be extended into each splice vault from each direction.

Tracer wire may be spliced at intervals of not less than 150 m. Splices shall conform to Section 86-2.09, "Wiring," of the Standard Specifications.

10-3.09 WARNING TAPE

Warning tape shall be provided and placed in the trench over conduits containing fiber optic cable as shown on the plans. The warning tape shall be 100 mm wide with bold printed black letters of approximately 19 mm on bright orange color background, and contain the printed warning "CAUTION BURIED FIBER OPTIC CABLE - CALTRANS" repeated at approximately 760 mm intervals.

The printed warning shall be non-erasable and shall be rated to last with the tape for a minimum of 40 years.

The construction of the warning tape shall be such that it will not delaminate when it is wet. It shall be resistant to insects, acid, alkaline and other corrosive elements in the soil. It shall have a minimum of 712 N. tensile strength per 150 mm wide strip and shall have a minimum of 700 percent elongation before breakage.

10-3.10 COLORED CONCRETE BACKFILL

The concrete backfill for the installation of fiber optic conduits shall be a medium to dark, red or orange color to clearly distinguish the concrete backfill from other concrete and soil. The concrete shall be pigmented by the addition of commercial quality cement pigment to the concrete mix. The red or orange concrete pigment shall be LM Scofield Company; Orange Chromix Colorant; Davis Colors; or equal.

For trenches in pavement areas, only the top 102mm of concrete backfill will be required to be pigmented concrete. At the option of the Contractor, the full depth may have the pigment.

10-3.11 INNERDUCT

Innerduct shall be installed wherever fiber optic cable is installed in conduit.

Innerduct consists of an extruded flexible annealed polyethylene tubing that is installed inside electrical conduit, and which in turn the fiber optic cable is installed. Innerduct within a conduit run shall be continuous without splices or joints. Innerduct for this project shall be continuous longitudinally ribbed inside and outside.

Unless otherwise shown on the plans, innerduct for this project shall be nominal 19 mm inside diameter, with wall thickness of 2000 μm \pm 80 μm , and shall meet the following requirements:

Polyethylene for innerduct shall have a density of 0.955 \pm 0.005 gm/cm³ (ASTM Standard D-1505), and shall conform to the applicable portions of ASTM Designations: D 3485, D 3035, D 2239, and D 2447, and the applicable portions of NEMA TC7 and TC2. Tensile yield strength shall be 22.7 MPa, minimum (ASTM D-638).

The innerduct shall be shipped on reels marked with the manufacturer, the contract number, and the size and length of the innerduct. The product on reels shall be covered with aluminized material to protect colors from UV deterioration during shipment and storage.

Immediately prior to installing innerducts, all conduits shall be blown out with compressed air until all foreign material is removed. After cables, conductors and innerduct have been installed, the ends of innerducts shall be sealed with an approved type of sealing plugs.

A manufacturer recommended lubricant shall be applied between the innerducts and the conduit during installation to reduce friction.

Installation procedures shall conform to the procedures specified by the innerduct manufacturer. If the innerduct is installed using mechanical assistance, a dynamometer shall be used to record installation tension and a tension limiting device shall be used to prevent exceeding the maximum pulling tension during installation. The tension shall be set to the manufacturer's maximum limit. The maximum pulling tension shall be recorded for each innerduct run. The innerduct shall not be stressed beyond the minimum bending radius allowed by either the innerduct or fiber optic cable manufacturer.

Immediately prior to installing cables, innerduct shall be blown out with compressed air until all foreign material is removed. After cables have been installed, the ends of innerducts shall be sealed with an approved type of rubber conduit plug.

Each innerduct shall be one continuous unit within a conduit run.

10-3.12 ROUND TRAFFIC FIBER OPTIC SPLICE VAULTS

Fiber optic splice vaults shall conform to the Western Underground Committee Guide No. 3.6, "Nonconcrete Enclosures," except where differences are noted here or detailed on the plans. Dimensions of round traffic fiber optic splice vaults shall be as shown on the plans.

Fiber optic splice vault covers shall be rated for AASHTO HS 20-44 loading and shall be installed at the locations and in the manner shown on the plans. Concrete placed around and under traffic splice vaults shall be minor concrete and shall contain not less than 325 kg of portland cement per cubic meter.

Hangers shall be made of a non-corroding material and be free of any sharp edges. A separate hanger shall be provided for each type of fiber optic cable and be securely fastened to the side wall of the vault allowing the slack fiber optic cable to be neatly coiled in a circular configuration.

Pulling eyes shall be installed as necessary to accommodate pulling of cables.

Tops of fiber optic vaults shall be installed at grade in paved areas and 25 mm above grade in unpaved areas.

10-3.13 CONDUCTORS AND WIRING

Splices shall be insulated by "Method B".

The minimum insulation thickness, at any point, for Type USE, RHH or RHW wire shall be 1.0 mm for conductor sizes No. 14 to No. 10, inclusive, and 1.3 mm for No. 8 to No. 2, inclusive. The minimum insulation thickness, at any point, for Type THW and TW wires shall be 0.69 mm for conductor sizes No. 14 to No. 10, inclusive, 1.02 mm for No. 8, and 1.37 mm for No. 6 to No. 2, inclusive.

10-3.14 SERVICE

Continuous welding of exterior seams in service equipment enclosures is not required.

Type III service equipment enclosures shall be the aluminum type.

Circuit breakers shall be the cable-in/cable-out type, mounted on non-energized clips. All circuit breakers shall be mounted vertically with the up position of the handle being the "ON" position.

The Contractor shall pay for all connection fees.

10-3.15 STATE-FURNISHED CONTROLLER ASSEMBLIES

The Model 170 controller assemblies, including controller unit, completely wired controller cabinet and inductive loop detector sensor units, but without anchor bolts, will be State-furnished as provided under "Materials" of these special provisions.

The Contractor shall construct each controller cabinet foundation as shown on Standard Plan ES-3C for 334 cabinets (including furnishing and installing anchor bolts), shall install the controller cabinet on the foundation, and shall make field wiring connections to the terminal blocks in the controller cabinet.

A listing of field conductor terminations, in each State-furnished controller cabinet, will be furnished free of charge to the Contractor at the site of the work.

State forces will maintain controller assemblies. The Contractor's responsibility for controller assemblies shall be limited to conforming to the provisions in Section 6-1.02, "State-Furnished Materials," of the Standard Specifications.

10-3.16 VEHICLE SIGNAL FACES AND SIGNAL HEADS

Light Emitting Diode (LED) signal modules for vehicular traffic signal units (except programmed visibility type) will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

Type SV-1-T mountings with 5 sections and SV-2-TD mountings shall be bolted to the standard through the upper pipe fitting in the same manner shown for bolting the terminal compartment.

10-3.17 PEDESTRIAN SIGNALS

Light Emitting Diode (LED) modules for Type A pedestrian signals will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

Pedestrian signal modification kits for Type A pedestrian signals shall be designed to convert an existing pedestrian signal face to the message symbols specified in Section 86-4.06, "Pedestrian Signal Faces," of the Standard Specifications. The modified signal face shall conform to the provisions in Section 86-4.06A, "Types," of the Standard Specifications.

10-3.18 DETECTORS

Loop detector sensor units will be State-furnished in conformance with the provisions in "Materials" of these special provisions.

Loop wire shall be Type 2.

Loop detector lead-in cable shall be Type B.

Slots shall be filled hot-melt rubberized asphalt sealant.

At the Contractor's option, where a Type A or a Type B loop is designated on the plans, a Type E loop may be substituted.

For Type E detector loops, sides of the slot shall be vertical and the minimum radius of the slot entering and leaving the circular part of the loop shall be 40 mm. Slot width shall be a maximum of 20 mm. Loop wire for circular loops shall be Type 2. Slots of circular loops shall be filled with elastomeric sealant or hot melt rubberized asphalt sealant.

PREFORMED INDUCTIVE LOOPS

Preformed inductive loops shall be the type shown on the plans.

The loop shall be 1.8 m square unless otherwise shown. The loop shall consist of 4 turns of No. 16, or larger, wire with Type THWN or TFFN insulation.

The loop wires shall be encased in Size 10, minimum, Schedule 40 or Schedule 80 PVC or polypropylene conduit. The conduit shall be sealed to prevent the entrance of water and the movement of wires within the conduit.

The loop wires from the preformed loop to the adjacent pull box shall be twisted together into a pair (at least 7 turns per meter) and encased in Schedule 40 or Schedule 80 PVC or polypropylene conduit between the preformed loop and the adjacent pull box or detector handhole. The lead-in conduit shall be sealed to prevent the entrance of water at the pull box or handhole end.

In new roadways, the preformed loops and lead-in conduits shall be placed in the base course, with the top of the conduit flush with the top of the base, and then covered with asphalt concrete or portland cement concrete pavement. Preformed loops and lead-in conduits shall be protected from damage prior to and during pavement placement.

In new reinforced concrete structure decks, the preformed loops shall be secured to the top of the uppermost layer of reinforcing steel using nylon wire ties. The loop shall be held parallel to the structure deck by using PVC or polypropylene spacers where necessary. Conduit for lead-in conductors shall be placed between the uppermost 2 layers of reinforcing steel.

Preformed inductive loops shall not be installed in existing structure decks.

In existing pavement, preformed loop installation shall conform to the following:

- A. Preformed loops and lead-in conduits shall be placed in slots, 32 mm, minimum width, cut into the existing pavement. The top of the conduit shall be 50 mm, minimum, below the top of pavement.
- B. Slots in asphalt concrete pavement shall be filled with elastomeric sealant or hot-melt rubberized asphalt sealant.
- B. Slots in asphalt concrete pavement shall be filled with asphaltic concrete sealant as follows:
 - 1. After conductors are installed in the slots cut in the pavement, a paint binder shall be applied to all vertical surfaces of slots in conformance with the provisions in Section 39-4.02, "Prime Coat and Paint Binder," of the Standard Specifications.
 - 2. Temperature of the sealant material during installation shall be above 21°C. Air temperature during installation shall be above 10°C. Sealant placed in the slots shall be compacted by the use of a 200-mm diameter by 3-mm thick steel hand roller or other tool approved by the Engineer. Compacted sealant shall be flush with the pavement surface. Minimum conductor coverage shall be 25 mm. Excess sealant remaining after rolling shall not be reused. On completion of rolling, traffic will be permitted to travel over the sealant.
- C. Slots in portland cement concrete pavement shall be filled with epoxy sealant or hot melt rubberized asphalt sealant.

10-3.19 LUMINAIRES

Ballasts shall be the lag type.

10-3.20 INTERNALLY ILLUMINATED SIGNS

The "METER ON" sign shall be a Type A pedestrian signal modified so that the reflector shall be a single chamber with 2 incandescent lamps.

The message shall be white "METER ON" as shown on the plans. White color shall be in conformance with the provisions in Section 86-4.06, "Pedestrian Signal Faces," of the Standard Specifications.

10-3.21 FIBER OPTIC COMMUNICATION CABLE PLANT

FIBER OPTICS GLOSSARY

Breakout. -- The cable "breakout" is produced by (1) removing the jacket just beyond the last tie-wrap point, (2) exposing 1 to 2 m of the cable buffers, aramid strength yarn and central fiberglass strength member, and (3) cutting the aramid yarn, central strength member and the buffer tubes to expose the individual glass fibers for splicing or connection to the appropriate device.

Connector. -- A mechanical device used to provide a means for attaching to and decoupling from a transmitter, receiver, or another fiber (such as on a patch panel).

Connectorized. -- The termination point of a fiber after connectors have been affixed.

Connector Module Housing (CMH). -- A patch panel used to terminate singlemode or multimode fibers with most common connector types. It may include a jumper storage shelf and a hinged door.

Couplers. -- Couplers are devices which mate two fiber optic connectors to facilitate the transition of optical light signals from one connector into another. They are normally located within FDFs and ITUs mounted in panels. They may also be used unmounted, to join two simplex fiber runs.

F/O. -- Fiber optic

FOIP. -- Fiber optic inside plant cable

FOP. -- Fiber optic outside plant cable

FOTP. -- Fiber optic test procedure(s) as defined by EIA/TIA standards.

Interconnect and Termination Unit (ITU). -- A patch panel used to terminate fibers with most common connector types. It may include a jumper storage shelf and a hinge door.

Jumper. -- A short, typically 1 meter or less, used to join two Connector Module Housing (CMH) couplers or a CMH to active electronic components.

Light Source. -- Portable fiber optic test equipment that, when coupled with a power meter, is used to perform end-to-end attenuation testing. It contains a stabilized light source operating at the designed wavelength of the system under test.

Link. -- A passive section of the system, the ends of which are connectorized. A link may include splices and couplers. For example, a video link may be from a F/O transmitter to a video multiplexer (MUX).

Link Loss Budget. -- A calculation of the overall permissible attenuation from the fiber optic transmitter (source) to the fiber optic receiver (detector).

Loose Tube Cable. -- Type of cable construction in which fibers are placed in filled buffer tubes to isolate them from outside forces (stress). A flooding compound or material is applied to the interstitial cable core to prevent water migration and penetration. This type of cable is primarily for outdoor applications.

Mid-Span Access Method. -- A procedure in which fibers from a single buffer tube are accessed and spliced to an adjoining cable without cutting the unused fibers in the buffer tube or disturbing the remaining buffer tubes in the cable.

Optical Time Domain Reflectometer (OTDR). -- Fiber optic test equipment similar in appearance to an oscilloscope that is used to measure the total amount of power in a fiber optic cable between two points. It provides a visual and printed display of the losses associated with system components such as fiber, splices and connectors.

Patchcord. -- A term used interchangeably with "jumper".

Patch Panel. -- A precision drilled metal frame containing couplers used to make two (2) fiber optic connectors.

Pigtail. -- Relatively short length of fiber optic cable that is connectorized on only one end.

Power Meter. -- Portable fiber optic test equipment that, when coupled with a light source, is used to perform end-to-end attenuation testing. It contains a detector that is sensitive to light at the designed wavelength of the system under test. Its display indicates the amount of optical power received at the end of the link.

Riser Cable. -- NEC approved cable installed in a riser (a vertical shaft in a building connecting one floor to another).

Segment. -- A section of F/O cable that is not connected to any active device and may or may not have splices per the design.

Splice. -- The permanent joining of two fiber ends using a fusion splicer.

Splice Closure. -- An environmentally sealed container used to organize and protect splice trays. The container allows splitting or routing of fiber cables from multiple locations. Normally installed in a splice vault.

Splice Module Housing (SMH). -- A unit that stores splice trays as well as pigtails and short cable lengths. The unit allows splitting or routing of fiber cables to or from multiple locations.

Splice Tray. -- A container used to organize and protect spliced fibers.

Splice Vault. -- A container used to organize and protect spliced fibers.

Tight Buffered, Non-Breakout Cable (Tight Buffer Cable). -- Type of cable construction where each glass fiber is tightly buffered (directly coated) with a protective thermoplastic coating to 900 μm (compared to 250 μm for loose tube fibers).

FIBER OPTIC OUTSIDE PLANT CABLE

GENERAL

Each fiber optic outside plant cable (FOP) for this project shall be all dielectric, gel filled, duct type, with loose buffer tubes and shall conform to these special provisions. Cables with singlemode fibers shall contain 12 singlemode (SM) dual-window (1310 nm and 1550 nm) fibers.

The optical fibers shall be contained within loose buffer tubes. The loose buffer tubes shall be stranded around an all dielectric central member. Aramid yarn and/or fiberglass shall be used as a primary strength member, and a polyethylene outside jacket shall provide for overall protection.

All fiber optic (F/O) cable on this project shall be from the same manufacturer, who is regularly engaged in the production of this material.

The cable shall be qualified as compliant with Chapter XVII, Title 7, Part 1755-900 of the Code of Federal Regulations, "REA specification for filled fiber optic cables" (which replaced the United States Department of Agriculture Rural Electrification Administration specifications REA-PE-90).

The following is the fiber count for each type of fiber optic cable:

Type B fiber optic cable shall contain 60 singlemode fibers.

Type C fiber optic cable shall contain 48 singlemode fibers.

Type D fiber optic cable shall contain 12 singlemode fibers.

FIBER CHARACTERISTICS

Each optical fiber shall be glass and consist of a doped silica core surrounded by concentric silica cladding. All fibers in the buffer tube shall be usable fibers, and shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of these specifications. The required fiber grade SM shall reflect the maximum individual fiber attenuation, to guarantee the required performance of each and every fiber in the cable.

The coating shall be a dual layered, UV cured acrylate. The coating shall be mechanically or chemically strippable without damaging the fiber.

The cable shall comply with the optical and mechanical requirements over an operating temperature range of -40°C to +70°C. The cable shall be tested in accordance with EIA-455-3A (FOTP-3), "Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components." The change in attenuation at extreme operational temperatures (-40°C to +70°C) for singlemode fiber shall not be greater than 0.20 dB/km, with 80 percent of the measured values no greater than 0.10 dB/km. The singlemode fiber measurement is made at 1550 nm.

For all fibers the attenuation specification shall be a maximum attenuation for each fiber over the entire operating temperature range of the cable.

Singlemode fibers within the finished cable shall meet the requirements in the following table:

Fiber Characteristics Table

Parameters	SM
Type	Step Index
Core diameter	8.3 μm (nominal)
Cladding diameter	125 $\mu\text{m} \pm 1.0 \mu\text{m}$
Core to Cladding Offset	<0.8 μm
Coating Diameter	250 $\mu\text{m} \pm 15 \mu\text{m}$
Cladding Non-circularity defined as: $[1 - (\text{Min cladding Dia} \div \text{Max cladding Dia})] \times 100$	<1.0%
Proof/Tensile Test	345 MPa, minimum
Attenuation: @1310 nm @1550 nm	<0.4 dB/km <0.4 dB/km
Attenuation at the Water Peak	<2.1 dB/km @ 1383 ± 3 nm
Bandwidth at 1310 nm	N/A
Chromatic Dispersion: Zero Dispersion Wavelength	1301.5 to 1321.5 nm
Zero Dispersion Slope	<0.092 ps/(nm ² *km)
Maximum Dispersion:	<3.3 ps/(nm*km) for 1285 - 1330 nm <18 ps/(nm*km) for 1550 nm
Cut-Off Wavelength	<1250 nm
Numerical Aperture (measured in accordance with EIA-455-47 (FOTP-47))	N/A
Mode Field Diameter (Petermann II)	9.3 $\pm 0.5 \mu\text{m}$ at 1300 nm 10.5 $\pm 1.0 \mu\text{m}$ at 1550 nm

COLOR CODING

Optical fibers shall be distinguishable from others in the same buffer tube by means of color coding according to the following:

1. Blue (BL)	7. Red (RD)
2. Orange (OR)	8. Black (BK)
3. Green (GR)	9. Yellow (YL)
4. Brown (BR)	10. Violet (VL)
5. Slate (SL)	11. Rose (RS)
6. White (WT)	12. Aqua (AQ)

Buffer tubes containing fibers shall also be color coded with distinct and recognizable colors according to the same table listed above for fibers.

The colors shall be targeted in accordance with the Munsell color shades and shall meet EIA/TIA-598 "Color Coding of Fiber Optic Cables."

The color formulation shall be compatible with the fiber coating and the buffer tube filling compound, and be heat stable. It shall not fade or smear or be susceptible to migration and it shall not affect the transmission characteristics of the optical fibers and shall not cause fibers to stick together.

CABLE CONSTRUCTION

General. -- The fiber optic cable shall consist of, but not be limited to, the following components:

- A. Buffer tubes
- B. Central member
- C. Filler rods
- D. Stranding
- E. Core and cable flooding
- F. Tensile strength member
- G. Ripcord
- H. Outer jacket

Buffer tubes. -- Loose buffer tubes shall provide clearance between the fibers and the inside of the tube to allow for expansion without constraining the fiber. The fibers shall be loose or suspended within the tubes and shall not adhere to the inside of the tube. Each buffer tube shall contain a maximum of 12 fibers.

The loose buffer tubes shall be extruded from a material having a coefficient of friction sufficiently low to allow free movement of the fibers. The material shall be tough and abrasion resistant to provide mechanical and environmental protection of the fibers, yet designed to permit safe intentional "scoring" and breakout, without damaging or degrading the internal fibers.

Buffer tube filling compound shall be a homogenous hydrocarbon-based gel with anti-oxidant additives and used to prevent water intrusion and migration. The filling compound shall be non-toxic and dermatologically safe to exposed skin. It shall be chemically and mechanically compatible with all cable components, non-nutritive to fungus, non-hygroscopic and electrically non-conductive. The filling compound shall be free from dirt and foreign matter and shall be readily removable with conventional nontoxic solvents. An absorbent polymer, which fills voids and swells to block the ingress of water can be used instead of the gel fill.

Buffer tubes shall be stranded around a central member by a method that will prevent stress on the fibers when the cable jacket is placed under strain, such as the reverse oscillation stranding process.

Each buffer tube shall be distinguishable from other buffer tubes in the cable by means of color coding as specified above for fibers.

Central Member. -- The central member, which functions as an anti-buckling element, shall be a glass reinforced plastic rod with similar expansion and contraction characteristics as the optical fibers and buffer tubes. To provide the proper spacing between buffer tubes during stranding a linear overcoat of polyethylene may be applied to the central member to achieve the optimum diameter.

Filler rods. -- Fillers may be included in the cable to lend symmetry to the cable cross-section where needed. Filler rods shall be solid medium or high density polyethylene. The diameter of filler rods shall be the same as the outer diameter of the buffer tubes.

Stranding. -- Completed buffer tubes shall be stranded around the overcoated central member using stranding methods, lay lengths and positioning such that the cable shall meet mechanical, environmental and performance specifications. A polyester binding shall be applied over the stranded buffer tubes to hold them in place. Binders shall be applied with sufficient tension to secure the buffer tubes to the central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking (or rendered so by the flooding compound), and dielectric with low shrinkage.

Core and Cable Flooding. -- The cable core interstices shall contain a water blocking material to prevent water ingress and migration, the water blocking material shall be either a polyolefin based compound or an absorbent polymer, which fills voids and swells to block the ingress of water. The flooding compound shall be homogeneous, non-hygroscopic, electrically non-conductive, and non-nutritive to fungus. The compound shall also be nontoxic, dermatologically safe and compatible with all other cable components.

Tensile Strength Member. -- Tensile strength shall be provided by high tensile strength aramid yarns and/or fiberglass which shall be helically stranded evenly around the cable core and shall not adhere to other cable components.

Ripcord. -- The cable shall contain at least one ripcord under the jacket for easy sheath removal.

Outer jacket. -- The jacket shall be free of holes, splits, and blisters and shall be medium or high density polyethylene (PE), or medium density cross-linked polyethylene with minimum nominal jacket thickness of 1000 ± 70 μm . Jacketing material shall be applied directly over the tensile strength members and flooding compound and shall not adhere to the aramid strength material. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.

The jacket or sheath shall be marked with the manufacturer's name, the words "Optical Cable", the number of fibers, "SM", year of manufacture, and sequential measurement markings every meter. The actual length of the cable shall be within $-0/+1$ percent of the length marking. The marking shall be in a contrasting color to the cable jacket. The height of the marking shall be approximately 2.5 mm.

GENERAL CABLE PERFORMANCE SPECIFICATIONS

The F/O cable shall withstand water penetration when tested with a one meter static head or equivalent continuous pressure applied at one end of a one meter length of filled cable for one hour. No water shall leak through the open cable end. Testing shall be done in accordance with EIA-455-82 (FOTP-82), "Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable."

A representative sample of cable shall be tested in accordance with EIA-455-81A (FOTP-81), "Compound Flow (Drip) Test for Filled Fiber Optic Cable". No preconditioning period shall be conducted. The cable shall exhibit no flow (drip or leak) at 65°C as defined in the test method.

Crush resistance of the finished F/O cables shall be 220 N/cm applied uniformly over the length of the cable without showing evidence of cracking or splitting when tested in accordance with EIA-455-41 (FOTP-41), "Compressive Loading Resistance of Fiber Optic Cables". The average increase in attenuation for the fibers shall be <0.10 dB at 1550 nm (singlemode) for a cable subjected to this load. The cable shall not exhibit any measurable increase in attenuation after removal of load. Testing shall be in accordance with EIA-455-41 (FOTP-41), except that the load shall be applied at the rate of 3 mm to 20 mm per minute and maintained for 10 minutes.

The cable shall withstand 25 cycles of mechanical flexing at a rate of 30 ± 1 cycles/minute. The average increase in attenuation for the fibers shall be <0.20 dB at 1550 nm (singlemode) at the completion of the test. Outer cable jacket cracking or splitting observed under 10x magnification shall constitute failure. The test shall be conducted in accordance with EIA-455-104 (FOTP-104), "Fiber Optic Cable Cyclic Flexing Test," with the sheaf diameter a maximum of 25 times the outside diameter of the cable. The cable shall be tested in accordance with Test Conditions I and II of (FOTP-104).

Impact testing shall be conducted in accordance with EIA-455-25 (FOTP-25) "Impact Testing of Fiber Optic Cables and Cable Assemblies." The cable shall withstand 20 impact cycles. The average increase in attenuation for the fibers shall be <0.20 dB at 1550 nm (singlemode). The cable jacket shall not exhibit evidence of cracking or splitting.

The finished cable shall withstand a tensile load of 2700 N without exhibiting an average increase in attenuation of greater than 0.20 dB (singlemode). The test shall be conducted in accordance with EIA-455-33 (FOTP-33), "Fiber Optic Cable Tensile Loading and Bending Test." The load shall be applied for one-half hour in Test Condition II of the EIA-455-33 (FOTP-33) procedure.

PACKAGING AND SHIPPING REQUIREMENTS

Documentation of compliance to the required specifications shall be provided to the Engineer prior to ordering the material. The cable manufacturer shall be 1509001 registered.

Attention is directed to "Fiber Optic Testing," elsewhere in these special provisions.

The completed cable shall be packaged for shipment on reels. The cable shall be wrapped in a weather and temperature resistant covering. Both ends of the cable shall be sealed to prevent the ingress of moisture.

Each end of the cable shall be securely fastened to the reel to prevent the cable from coming loose during transit. Four meters of cable length on each end of the cable shall be accessible for testing.

Each cable reel shall have a durable weatherproof label or tag showing the manufacturer's name, the cable type, the actual length of cable on the reel, the Contractor's name, the contract number, and the reel number. A shipping record shall also be included in a weatherproof envelope showing the above information and also include the date of manufacture, cable characteristics (size, attenuation, bandwidth, etc.), factory test results, cable identification number and any other pertinent information.

The minimum hub diameter of the reel shall be at least thirty times the diameter of the cable. The F/O cable shall be in one continuous length per reel with no factory splices in the fiber. Each reel shall be marked to indicate the direction the reel should be rolled to prevent loosening of the cable.

Installation procedures and technical support information shall be furnished at the time of delivery.

FIBER OPTIC LABELING

Abbreviation:

HUB	HUB.X
VAULT	VXX.X
CAMERA	CXX.X

The X's denote the kilopost of the above elements.

Pigtails:

Cable Type	From	To	Fiber No.
X	-XXX.X	-XXX.X	-XX

A label shall be placed on each pigtail near the connector showing the point of origin of the link and the termination of the link. A label with the fiber number being spliced shall be placed on the end of the pigtail near the splice.

Example labeling: C-HUB.A-C44.5-10.

Splice Vaults:

Cable Type	From	To
X	-XXX.X	-XXX.X

A label shall be placed on Type B, C and D cables as they enter and exit each splice vault.. A label shall be placed on the cable inside the closed circuit television, ramp meter, vehicle detection station and TOS assemblies.

Example labeling: C-HUB.A-HUB.E

Example labeling: D-C044.5-V044.8

Jumpers:

Equipment From	Equipment To
ID No. by	ID No. by

Both ends shall be labeled near the connector. The label shall be the same on both ends and denote where the ends of the jumper are plugged into.

Splice Trays:

A label shall be placed on each splice tray explaining the splices in the tray.

CABLE INSTALLATION

Installation procedures shall be in conformance with the procedures specified by the cable manufacturer for the specific cable being installed. The Contractor shall submit the manufacturer's recommended procedures for pulling fiber optic cable at least 20 working days prior to installing cable. Mechanical aids may be used, provided that a tension measuring device, and a breakaway swivel are placed in tension to the end of the cable, and the allowable tension does not exceed the manufacturers recommended pulling tension.

During cable installation, the bend radius shall be maintained at a minimum of twenty times the outside diameter of the cable. The cable grips for installing the fiber optic cable shall have a ball bearing swivel to prevent the cable from twisting during installation.

The F/O cable shall be installed using a cable pulling lubricant recommended by the F/O cable and/or innerduct manufacturer and a non-abrasive pull tape conforming to the provisions described under "Conduit", elsewhere in these special provisions. Contractor's personnel shall be stationed at each splice vault through which the cable is to be pulled to lubricate and prevent kinking or other damage.

Splicing of Type D cables to Type C cable shall involve only those fibers being spliced as shown on the plans. Cable splices shall be located in splice vaults shown on the plans. A minimum of 36 m of slack shall be provided at each splice vault. Slack shall be divided equally on each side of the F/O splice closure.

The mid-span access method shall be used to access the individual fibers in the distribution cable for splicing to the accessory cable. Cable manufactures recommended procedures and approved tools shall be used when performing a mid-span access. All measures shall be taken to avoid damaging buffer tubes and individual fibers not being used in the mid-span access. The Contractor will be allowed to splice a total of 5 fibers to repair any damage done during mid-span access splicing without penalty. For each additional splice the Contractor will be assessed \$300.00. Any single fiber may not have more than 3 unplanned splices. If the fiber needs to be spliced more than 3 times, the entire length of the F/O cable must be replaced at the Contractor's expense.

Following the installation of the cable in innerduct, all duct entrances in cabinets, pull boxes and vaults shall be sealed as described under "Conduit" elsewhere in these special provisions.

Unless shown or provided otherwise, only one F/O cable shall be installed in each innerduct. Pulling a separate F/O cable into a spare duct to replace damaged fiber will not be allowed.

At the Contractor's option, the fiber optic cable may be installed by using the air blown method. If integral innerduct is used, the innerduct splice points or any temporary splices used for installation must withstand a static air pressure of 760 kPa.

The fiber installation equipment shall incorporate a mechanical drive unit or pusher which feeds cable into the pressurized innerduct to provide a sufficient push force on the cable, which is coupled with the drag force created by the high-speed airflow. The unit shall be equipped with controls to regulate the flow rate of compressed air entering the innerduct and any hydraulic or pneumatic pressure applied to the cable. It shall accommodate longitudinally ribbed, or smooth wall innerducts from nominal 15 mm to 50 mm inner diameter. Mid assist or cascading of equipment shall be for the installation of long cable runs. The equipment shall incorporate safety shutoff valves to disable the system in the event of sudden changes in pneumatic or hydraulic pressure.

The equipment shall not require the use of a piston or any other air capturing device to impose a pulling force at the front end of the cable, which also significantly restricts the free flow of air through the innerduct. It shall incorporate the use of a counting device to determine the speed of the cable during installation and the length of the cable installed.

SPLICING

Field splices shall be done either in splice vaults or cabinets as shown on the plans. All splices in splice vaults shall be done in splice trays, housed in splice closures. All splices in cabinets shall be done in splice trays housed in ITUs. All splices done in communication hubs shall be done in splice trays housed in FDUs.

Unless otherwise allowed, the F/O cable splices shall be the fusion type. The mean splice loss shall not exceed 0.07 dB per splice. The mean splice loss shall be obtained by measuring the loss through the splice in both directions and then averaging the resultant values.

When splicing selected fiber of two cables, a "mid-span access" method shall be used. The individual fibers shall be looped one full turn within the splice tray to avoid micro bending. A 45 mm minimum bend radius shall be maintained during installation and after final assembly in the optical fiber splice tray. Each bare fiber shall be individually restrained in a splice tray. The optical fibers in buffer tubes and the placement of the bare optical fibers in the splice tray shall be such that there is no discernible tensile force on the optical fiber.

All splices shall be protected with a metal reinforced thermal shrink sleeve.

SPLICE CLOSURES AND SPLICE TRAYS

The F/O field splices shall be enclosed in splice closures which shall be complete with splice organizer trays, brackets, plugs, clips, cable ties, seals and sealants, as needed. The splice closure shall be suitable for a direct burial or pull box application. The manufacturer's installation instructions shall be supplied to the Engineer prior to the installation of any splice closures. Location of the splice closures shall be where a splice is required as shown on the plans, designated by the Engineer, or described in these special provisions

The splice closure shall conform to the following:

- non filled thermoplastic case
- pressurizable, rodent proof, water proof, re-enterable and moisture proof
- expandable from 2 cables per end to 8 cables per end by using adapter plates
- cable entry ports shall accommodate 10 mm to 25 mm diameter cables
- multiple grounding straps
- accommodate up to 8 splice trays
- suitable for "butt" or "through" cable entry configurations
- place no stress on finished splices within the splice trays

Splice closures shall be bolted to the side wall of the splice vault.
Splice trays in the splice closures shall conform to the following:

- accommodate up to 24 fusion splices
- place no stress on completed splices within the tray
- accommodate "butt" or "through" splicing applications
- accommodate up to 8 buffer tubes, holding up to 48 fibers
- stackable with a snap-on hinge cover
- buffer tubes securable with channel straps
- contain fiber retention strips that accommodates either fusion or mechanical splices must be labeled per these special provisions

PASSIVE CABLE ASSEMBLIES AND COMPONENTS

The F/O cable assemblies and components shall be compatible components, designed for the purpose intended, and manufactured by a company regularly engaged in the production of material for the fiber optic industry. All components or assemblies shall be best quality, non-corroding, with a design life of at least 20 years.

FIBER OPTIC CABLE TERMINATIONS

DISTRIBUTION INTERCONNECT PACKAGE

General. -- Distribution involves connecting the fibers to the locations shown on the plans. The distribution interconnect package consists of FDU and/or ITUs with connector panels, couplers, splice trays, fiber optic pigtails and jumpers. The distribution interconnect package shall be assembled and tested by a company who is regularly engaged in the assembly of these packages. Attention is directed to "Fiber Optic Testing" elsewhere in these special provisions. All distribution components shall be products of the same manufacturers, who are regularly engaged in the production of these components, and the respective manufacturers shall have quality assurance programs.

FIBER OPTIC CABLE ASSEMBLIES AND PIGTAILS

General. -- Cable assemblies (jumpers and pigtails) shall be products of the same manufacturer. The cable used for cable assemblies shall be made of fiber meeting the performance requirements of these special provisions for the F/O cable being connected.

Pigtails. -- Pigtails shall be of simplex (one fiber) construction, in 900 μ m tight buffer form, surrounded by aramid for strength, with a PVC jacket with manufacturer identification information, and a nominal outer jacket diameter of 3 mm. Singlemode simplex cable jackets shall be yellow in color. All pigtails shall be factory terminated and tested and at least one meter in length.

Jumpers. -- Jumpers may be of simplex or duplex design. Duplex jumpers shall be of duplex round cable construction, and shall not have zipcord (siamese) construction. All jumpers shall be at least 2 meter in length, sufficient to avoid stress and allow orderly routing.

The outer jacket of duplex jumpers shall be colored according to the singlemode color (yellow) specified above. The two inner simplex jackets shall be contrasting colors to provide easy visual identification for polarity.

SC Connectors. -- SC type connectors shall meet the requirements of EIA/TIA-568A except as specified below. SC connector body housings shall be of polymer construction.

All F/O connectors shall have a 2.5 mm diameter, Zirconia Ceramic, SC connector ferrule with a PC (Physical Contact) pre-radius tip.

The SC connector operating temperature range shall be -40°C to +70°C. Insertion loss shall not exceed 0.4 dB for singlemode and the return reflection loss on connectors shall be at least 50 dB. Connection durability shall be less than a 0.2 dB change per 500 mating cycles per EIA-455-21A (FOTP-21). All terminations shall provide a minimum 222N pullout strength. Factory test results shall be documented and submitted to the Engineer prior to installing any of the connectors. Singlemode connectors shall have a blue color on the shroud and a white color on the boot in accordance with the Munsell color shades specified elsewhere, that renders them easily identifiable.

Field terminations shall be limited to splicing of adjoining cable ends and/or cables to SC pigtails.

ST Connectors. -- The ST type connectors shall meet the requirements of EIA/TIA-568A except as specified below. The ST connector body housings shall be of polymer construction.

All F/O connectors shall have a 2.5 mm diameter, Zirconia Ceramic, ST connector ferrule with a PC (Physical Contact) pre-radius tip.

The ST connector operating temperature range shall be -40°C to +70°C. Insertion loss shall not exceed 0.4 dB, for either multimode or singlemode, and the return reflection loss on singlemode connectors shall be at least 50 dB. Connection durability shall be less than a 0.2 dB change per 500 mating cycles per EIA-455-21A (FOTP-21). All terminations shall provide a minimum 222N pullout strength. Factory test results shall be documented and submitted to the Engineer prior to installing any of the connectors. Singlemode connectors shall have a blue color on the shroud and a white color on the boot in accordance with the Munsell color shades specified elsewhere, that renders them easily identifiable.

Field terminations shall be limited to splicing of adjoining cable ends and/or cables to ST pigtails.

SC Couplers. -- The SC couplers shall be made of polymer construction that is consistent with the material forming the associated SC connector body. The design mechanism for mounting the couplers to the ITU connector panel may be achievable using metal clips or fasteners but shall coincide with the ITU panel punch-outs.

All coupler sleeves shall be of the cylinder split ceramic or clover leaf design.

The temperature operating range for couplers shall be the same as that specified for the SC connectors.

ST Couplers. -- The ST couplers shall be made of polymer construction that is consistent with the material forming the associated ST connector body. The design mechanism for mounting the couplers to the ITU connector panel may be achievable using metal clips or fasteners but shall coincide with the ITU panel punch-outs.

All coupler sleeves shall be of the cylinder split ceramic or clover leaf design.

The temperature operating range for couplers shall be the same as that specified for the ST connectors.

Splice Trays. -- Splice trays must accommodate a minimum of 12 fusion splices. They must allow for a minimum bend radius of 45 mm. No stress can be placed on the fiber when it is located in its final position. Buffer tubes must be secured to the tray near the entrance of the splice tray to reduce the chance that an inadvertent tug on the pigtail will damage the fiber. Reduced length splice trays will only be allowed in wall mounted type fiber termination units. The splice tray cover must be transparent.

Only one single splice tray may be secured by a bolt through the center of the tray in the ITU. Multiple trays must be securely held in place by a different method.

INTERCONNECT AND TERMINATION UNIT

The Contractor shall furnish and install all related equipment to interface the rack mount interconnect and termination unit to the incoming fiber optic communications cable and the patchcord fiber optic cable.

The ITU shall be a modular enclosure that provides interconnect capability of one multi-fiber cable to a minimum of 12 single-fiber cable. The ITU shall be environmentally sealed and contain grommets at the cable entrances to prevent any ingress of dirt or moisture. Strain relief shall be provided for the fiber optic cable. The ITU shall contain a splice tray, connector panel and the appropriate number of pigtails which will be fusion spliced to the incoming fiber cable. Each fiber shall be fusion spliced to a pigtail with a factory installed and polished SC connector. Each pigtail shall be labeled and secured onto cable as described elsewhere in these special provisions. Brackets shall be provided to spool the incoming fiber optic cable to minimum of 3 turns before separating out individual fibers to the connector panel.

The ITU shall meet the following physical requirements:

482.6 mm rack mountable
305 mm(D) x 45 mm(H)

The ITU shall be a metal enclosure with a hinged door. The door shall have a latch or thumbscrew to hold the door in the closed position. An opening shall be provided on the back side of the incoming fiber optic communications cable. Connector panels (for up to 12 SC connectors) shall be provided inside the enclosure. Strain relief shall be provided for the incoming fiber optic cable. A guard shall be provided to protect the patchcord fiber optic cables plugged into this enclosure.

FIBER OPTIC TESTING

GENERAL

Testing shall include the tests on elements of the passive fiber optic components: (1) at the factory, (2) after installation but prior to connection to any other portion of the system, and (3) during final system testing. The Contractor shall provide all personnel, equipment, instrumentation and materials necessary to perform all testing. The Engineer shall be notified two working days prior to all field tests. The notification shall include the exact location or portion of the system to be tested.

Documentation of all test results shall be provided to the Engineer within 2 working days after the test involved.

A minimum of 20 days prior to arrival of the cable at the site, the Contractor shall provide detailed test procedures for all field testing for the Engineer's approval. The procedures shall include the tests involved and how the tests are to be conducted. Included in the test procedures shall be model, manufacturer, configuration, calibration and alignment procedures for all proposed test equipment.

FACTORY TESTING

Documentation of compliance with the fiber specifications as listed in the Fiber Characteristics Table shall be supplied by the original equipment manufacturer. After cabling, before shipment but while on the shipping reel, 100 percent of all fibers shall be tested for attenuation. Copies of the results shall be (1) maintained on file by the manufacturer with a file identification number for a minimum of 7 years, (2) attached to the cable reel in a waterproof pouch, and (3) submitted to the Contractor and to the Engineer.

AFTER CABLE INSTALLATION

After the fiber optic cable has been pulled but before breakout and termination, 100 percent of all the fibers shall be tested with an OTDR for attenuation. Test results shall be recorded, dated, compared and filed with the previous copies of these tests. Copies of traces and test results shall be submitted to the Engineer. If the OTDR test results are unsatisfactory, the F/O cable segment will be unacceptable. The unsatisfactory segment of cable shall be replaced with a new segment, without additional splices, at the Contractor's expense. The new segment of cable shall then be tested to demonstrate acceptability. Copies of the test results shall be submitted to the Engineer.

Attenuation tests shall be performed with an OTDR capable of recording and displaying anomalies of 0.02 dB as a minimum. Singlemode fibers (SM) shall be tested at 1310 nm and 1550 nm. Attenuation readings for each direction shall be recorded on the cable data sheet.

The OTDR shall have a printer capable of producing a verifying test trace with fiber identification, numerical loss values, the date and the operator's name. It shall also have a DOS based 89 mm disk recording capability that has associated software to do comparisons and reproductions on 216 mm x 279 mm paper, via a personal computer.

OUTDOOR SPLICES

At the conclusion of all outdoor splices at one location, and before they are enclosed and sealed, all splices shall be tested with the OTDR, in both directions. Splices in singlemode segments shall be tested at 1310 nm and at 1550 nm. Individual fusion splice losses shall not exceed 0.10 dB. Measurement results shall be recorded, dated, validated by the OTDR trace printout and filed with the records of the respective cable runs. Copies of traces and test results shall be submitted to the Engineer. If the OTDR test results are unsatisfactory, the splice shall be unacceptable. The unsatisfactory splice shall be replaced at the Contractor's expense. The new splice shall then be tested to demonstrate acceptability. Copies of the test results shall be submitted to the Engineer.

DISTRIBUTION INTERCONNECT PACKAGE TESTING AND DOCUMENTATION

All the components of the passive interconnect package (FDUs, ITUs, pigtails, jumpers, couplers and splice trays) shall comprise a unit from a manufacturer who is regularly engaged in the production of the fiber optic components described.

In developing the distribution interconnect package, each SC, ST and/or SC-ST hybrid termination (pigtail or jumper) shall be tested for insertion attenuation loss with the use of an optical power meter and source. In addition, all singlemode terminations shall be tested for return reflection loss. These values shall meet the loss requirements specified earlier and shall be recorded on a tag attached to the pigtail or jumper.

Once assembly is complete, the manufacturer shall visually verify that all tagging, including loss values, is complete. Then as a final quality control measure, the manufacturer shall do an "end to end" optical power meter/light source test from pigtail end to jumper lead end to assure continuity and overall attenuation loss values.

FIBER OPTIC SYSTEM DESIGN CRITERIA

The design system gain margin shall be at least 6 dB for each and every link. If the design system gain margin is less than 6 dB, the Engineer shall be notified and informed of the Contractor's plan to meet the design requirement. The Design System Gain Margin shall be calculated by subtracting the Total System Loss of each link (from Cable Verification Worksheet elsewhere in these special provisions) from the Total System Gain (measured during equipment testing).

ACTIVE COMPONENT TESTING

The transmitters and receivers shall be tested with a power meter and light source, to record the transmitter average power (dBm) and receiver sensitivity (dBm). These values shall be recorded in the Link Loss Budget Worksheet shown in Appendix A.

SYSTEM VERIFICATION AT COMPLETION

OTDR Testing.-- Once the passive cabling system has been installed and is ready for activation, 100 percent of the fibers shall be tested with the OTDR for splice loss and attenuation. Testing of fiber links shall be completed in such a way, to show the loss of each connector, in the OTDR trace. Test results shall be recorded, dated, compared and filed with previous copies. Copies of traces and test results shall be submitted to the Engineer. If the OTDR test results are unsatisfactory the cable shall be replaced at the Contractor's expense. The new cable shall then be tested to demonstrate acceptability. Copies of the test results shall be submitted to the Engineer.

Power Meter and Light Source.-- At the conclusion of the final OTDR testing, 100 percent of all fiber links shall be tested end to end with a power meter and light source, in accordance with EIA Optical Test Procedure 171 and in the same wavelengths specified for the OTDR tests. These tests shall be conducted in both directions. Test results shall be recorded on the Cable Verification Worksheet, compared and proven to be within the design link loss budgets, and filed with the other recordings of the same links.

Test Failures.-- If during any of these system verification tests, the results prove to be unsatisfactory, the F/O cable will not be accepted. The unsatisfactory segments of cable shall be replaced with a new segment of cable at the Contractor's expense. The new segment of cable shall undergo the same testing procedure to determine acceptability. Copies of the test results shall be submitted to the Engineer. The removal and replacement of a segment of cable shall be interpreted as the removal and replacement of a single contiguous length of cable connecting two splices, two connectors, or a splice and a connector. The removal of only the small section containing the failure and therefore introducing new unplanned splices, will not be allowed.

10-3.22 COMMUNICATION EQUIPMENT

GLOSSARY

APD	Avalanche Photodetector.
ADPCM	Adaptive Differential Pulse Code Modulation.
ALBO	Automatic Line Buildout. ALBO provides automatic cable equalization in T1 span-line interface equipment.
AMI	Alternate Mark Inversion.
AT&T	American Telephone and Telegraph Company.
B7	Binary 7.
B8ZS	Binary 8 Zero Substitution. A technique that modifies the alternate mark inversion encoding to ensure pulse density without altering the customer.
BER	Bit error rate.
BERTS	Bit error rate test set.
bps	bits per second.
CCITT	Consultative Committee on International Telegraphy and Telephony.
CGA	Carrier Group Alarm. A service alarm showing out-of-frame (OOF) conditions in the multiplexer.
CRC	Cyclic Redundancy Check.
D-4	A T1 framing format for channel bank operation.
DACS	Digital Access Cross connect System.
DDS	Digital Data System. DDS is a private line digital service provided by the Public Telephone Network. It supports data rates at 2400, 4800, 9600 and 56,000 bits per second.
DS0-A	A process where a subrate signal (2.4, 4.8, 9.6, 19.2 or 56 kbps) is repeated 20, 10 or 5 times carried over a signal DS0.
DS0-B	A process performed by a subrate multiplexer where twenty 2.4 kbps, ten 4.8 kbps or five 9.6 kbps signals are multiplexed into one 64 kbps DS0 channel.
DS0	Digital Signal, level zero. A 64 kbps signal. It is equal to one voice conversation digitized under pulse code modulation.
DS1	Digital Signal, level one. A 1.544 Mbps digital signal carried on a T1 transmission facility.
DSP	Digital Signal Processor.
DSU	Data Service Unit.

DSX-1	Digital Signal Cross-connect Level 1. A set of standard electrical parameters for cross-connecting DS1 lines.
DSX	Digital System Cross-connect frame. A bay or panel to which T1 lines and DS1 circuit packs are wired and that permits cross-connections by patch cords and plugs.
DTMF	Dual Tone Multi-Frequency.
E & M	Ear and Mouth.
ERL	Echo Return Loss.
ESF	Extended Super Frame. A T1 format that uses the 193rd bit as a framing bit. ESF provides frame synchronization, cyclic redundancy checking and data link bits.
FXO	Foreign Exchange Office.
FXS	Foreign Exchange Subscriber.
GS	Ground Start.
I/O	Input / Output.
IRE	An IRE is 1/100 part of the luminance (blanking to reference white) range. The zero IRE shall be at the blanking level and 100 IRE at reference white level. IRE below blanking level shall be referred to as negative values.
ISDN	Integrated Services Digital Network.
LBO	Electrical Line Build Out.
LGS	Loop Ground Start.
LS	Loop Start.
OCU	Office Channel Unit.
NTSC	National Television Systems Committee.
PCM	Pulse Code Modulation.
PLAR	Private line, Automatic Ringdown.
PLR	Pulse Link Repeater.
ppm	periodic pulse metering.
QRSS	Quasi Random Signal Source.
SRL	Signal Return Loss.
Switched 56	A switched line digital service provided by the Private Telephone Network. It supports 56 000 bits per second data rate only.
T1	A standard digital transmission link with a capacity of 1.544 Mbps normally handles 24 voice channels at 64 kbps.
TLP	Transmission Level Point.
VF	Voice Frequency.
μ-law	PCM coding and compounding standard used in North America.

GENERAL

Communication equipment shall conform to all rules and regulations of the Federal Communications Commission (FCC) and shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

The Contractor shall arrange to have a technician, qualified to work on the communication equipment and employed by the communication equipment manufacturer or his representative, present at the time the equipment is turned on.

Prototype equipment is not acceptable. All equipment shall be current standard production units and shall have been in use for a minimum of 6 months. Rebuilt or reconditioned equipment will not be allowed.

All rack mounted equipment and card cage assemblies shall have metal filler plates to cover any unused channel slots or card slots.

MODIFY COMMUNICATION HUB ASSEMBLY

There exists presently at the Communication Hub (60/91/215) a Newbridge Networks Model 3600 Mainstreet Bandwidth Manager. This T1/DS1 multiplexer provides equipment communications between Hub and TMC via a standard T1 bandwidth of 1.544 Mbps interface. Modifying Existing T1 Multidrop Communication System shall consist of installing the following equipment into the existing T1/DS1 multiplexer system at the Communication Hub at the 60/91/215 interchange.

Quantity	Description
2	Asynchronous fiber optic modems

RS-232 SERIAL CABLE

There shall be one RS-232 serial cable per asynchronous fiber optic modem to provide a link between the modems and the RS-232 Distribution Panel. The RS-232 serial cable shall meet the following requirements:

Length: 0.5 meters

Termination: DB-25p

Conductors: No. 22 AWG, THWN straight through DB-25 to DB-25

Cable Jacket: Polyethylene

ASYNCHRONOUS FIBER OPTIC MODEM

The asynchronous fiber optic modem (AFOM) shall be used as an RS-232C interface between 170 controller and T1/DS1 multiplexer via optical link. The modem located in the communication hub shall be a rack-mounted version installed in the card cage assembly. Model 170 controller interface modems shall be stand-alone units securely fastened on a rack-mounted shelf. An LED indicator shall be provided for use in determining received optical power.

The asynchronous fiber optic modem shall be fully compatible and interoperable with the existing International Fiber Systems Inc. models D9230SC (wall mount) and D9230SC-R3 (rack mount).

The modem shall meet the following requirements:

Electrical Signaling	Per EIA RS-232 with full handshake control signals
Electrical Power	Direct Current version: +9 to +14 V(dc) @ 32 mA, nominal. Alternate Current version: 115 V(ac) $\pm 10\%$, 60 Hz.
Bit Error Rate	1 in 10^9 within optical budget.
Operating Mode	Asynchronous, simplex or full duplex.
Input/Output Logic Level	I: +3.75 to +12 V. O: -3.75 to -12 V.
Input/Output Impedance	Per RS-232D
System Bandwidth	DC to 56/64 kbps
Optical Wavelength	1300 nm.
Minimum Optical Receiver Sensitivity	-30 dBm
Minimum Transmit Output Power	-10 dBm
Connectors Optical:	SC
Connectors Electrical (Data)	DB25 female
Number of fibers	2
Mechanical Size	177.8 mm (W) x 127 mm (D) x 25.4 mm (H) for stand-alone module
Weight	170 g for stand-alone module, nominal
Environmental Ambient:	
Temperature Range	-20°C to +70°C
Storage Temperature	-40°C to +85°C

The asynchronous fiber optic modem shall be tested as follows:

Each optical modem shall be functionally tested by looping back the optical transmit connector to the optical receive connector using a variable optical attenuator with measured optical loss of 20 dB, nominal, at 1300 nm. A test set shall be connected to the modem and set for RS-232 communications testing. A fifteen-minute test after burn-in shall be error free.

After performing the fifteen-minute bit error rate (BER) test, at least two modems shall be tested for receiver dynamic range. To do this the optical attenuation shall be increased to the point at which the data test just begins to register bit errors. The optical receive power into the modem shall be measured and recorded. The optical attenuation shall be then decreased until the data test once again registers errors. At no time shall the optical power into the receiver exceed the manufacturer's specified saturation level. The optical receive level shall once again be measured and recorded. These minimum and maximum receive levels define the modem receiver's dynamic range.

One pair of modems shall be interconnected using optical patchcords and attenuators with a loss of 20 dB, nominal, in each direction. The RS-232 interface shall be looped back on one modem and a test set connected to the RS-232 interface of the other modem. A bit error rate of less than 1 in 10^9 shall be demonstrated.

RS-232 PORT SHARING DEVICE

The RS-232 Port Sharing Device shall provide 2 or more RS-232 communication ports interconnected to a single main RS-232 port. The port-sharing device shall connect the output of one modem to two Model 170 controllers as shown in the design plans.

The RS-232 port-sharing device shall meet the following requirements:

FEATURE	REQUIREMENT
Master Ports	1 (DTE)
Slave Ports	Min. 2 (DCE)
Communication protocol	EIA 232D/CCITT V.24
Data Format	Synchronous or Asynchronous
Connectors	DB-25 Female
DB-25 Pins Supported	1-8, 15, 17, 20
Power Required	None
Operating Temperature	0°C to +60°C

MODEL 170 CONTROLLER INTERFACE

The Model 170 controller interface shall consist of an asynchronous fiber optic modem, an interface cable, and an interconnect and termination unit located in the Model 170 controller cabinet. The asynchronous fiber optic modem is described elsewhere in these special provisions.

At locations where the Ramp Metering System (RMS) and the Vehicle Detection Station (VDS) are combined, the Model 170 controller interface shall consist of an asynchronous fiber optic modem, interface cable, interconnect and termination unit, RS-232 port sharing device, and State-furnished Model 170 controller and VDS input files located in the Model 170 controller cabinet.

INTERFACE CABLE

Interface cable shall consist of six No. 22, stranded tinned copper conductors. Each conductor shall be insulated with 250 µm, minimum nominal thickness, color coded polypropylene material. Conductors shall be in twisted pairs. Each pair shall be wrapped with an aluminum polyester shield and shall have a No. 22 or larger, stranded, tinned copper drain wire inside the shielded pair.

The cable jacket shall be polyvinyl chloride, rated for a minimum of 300 V and 60°C, and shall have a minimum nominal wall thickness of 1 mm. The cable shall be 1 m long with an connector for termination to the Model 170 controller and a DB-25 connector to the asynchronous fiber optic modem. The connector at the Model 170 controller shall meet the following requirements:

Amphenol or equivalent	
Part	Number
Shield	201378-2
Block	201298-1
Guide Pin	200390-4
Socket	200389-4

The cable has the following pin configuration:

Asynchronous F/O Modem	CMS Model 170 Controller	
	Pin No.	Function
Ground	N	DC Ground
Carrier Detect	H	DCD
Data Out	L	Rx Data
Data In	K	Tx Data
Ready To Send	J	RTS
Clear To Send	M	CTS
	D	+5 V(dc)

Pin H shall be looped back to pin D and Pin J shall be looped back to pin M.

Asynchronous F/O Modem	VDS-RMS Model 170 Controller	
Function	Pin No.	Function
Ground	N	DC Ground
Carrier Detect	J	RTS
Data Out	L	Rx Data
Data In	K	Tx Data
Ready To Send	H	DCD
Clear To Send	-	CTS
	D	+5 V(dc)

Pin H shall be looped back to pin D and RTS shall be looped back to CTS.

INTERCONNECT AND TERMINATION UNIT

Interconnect and termination unit (ITU) shall be packaged in a 482 mm rack mount unit with dimensions of 432 mm (W) x 44 mm (H) x 280 mm (D) having metal housing slide-out shelf. The ITU shall contain grommets at cable entrances and provide strain relief for the fiber optic cable. The ITU shall accommodate either 12 or 48 singlemode fibers having SC type connector feed through adapters and either 12 or 48 interconnection points or splices. The components of the passive interconnect package shall be installed in the ITU.

10-3.23 SYSTEM TESTING AND DOCUMENTATION

DESCRIPTION

The system testing and documentation shall cover pre-installation testing, physical inspection, subsystem testing, fiber optic cable testing, data link testing, acceptance testing, functional testing, performance testing, final acceptance and system documentation that is required to validate the operational performance of the vehicle detection system, closed circuit television, communication system and ramp metering system, as shown on the plans and described elsewhere in these special provisions.

PRE-INSTALLATION TESTING

Pre-inspection testing shall include testing of all material, equipment and cable in a laboratory environment prior to delivery to the site. Use of laboratory facilities, including an environmental simulation chamber, shall be arranged by the Contractor. The tests shall either be conducted at the equipment manufacturer's premises or at a laboratory arranged by the Contractor.

All material, except test equipment and special tools, shall be bench tested in accordance with the following paragraphs, which include those items described elsewhere requiring pre-installation testing.

All active equipment shall be connected to normal operating power, energized and subjected to normal operating conditions for a continuous period of time in the laboratory of not less than 48 hours.

Functional testing shall be performed by the manufacturer on all material prior to delivery to the site. The functional tests shall be performed in accordance with an approved test plan. Any material or equipment which fails to meet the requirements of the contract shall be repaired or replaced and the test shall be repeated until satisfactory. All functional test results, including results of failed tests or re-tests, shall be submitted and delivered with all material and equipment delivered to the site.

Full performance test shall be performed by the manufacturer or by the Contractor on not less than 5 percent or at least one unit of material selected at random from the normal production run. The full performance test shall be performed in accordance with test plan developed by the Contractor and approved by the Engineer.

PHYSICAL INSPECTION

The Contractor shall provide documentation to prove delivery of all material, equipment, cable and documentation. If any material or documentation is outstanding or have been replaced under pre-acceptance warranty a physical inspection and documentation shall be provided for this material. The physical inspection shall consist of inspecting all installed material to ensure workmanship satisfies the specified requirements.

ACCEPTANCE TESTING

The acceptance testing includes the preparation of an acceptance test plan, conducting acceptance tests and subsequent retests, and documentation of the results.

Final acceptance tests shall be conducted after the site test results have been reviewed and accepted by the Engineer. These tests include the complete system in normal operations. Installation documentation and test results shall be provided for all material, equipment and cable prior to submission of the acceptance test plan and commencement of acceptance tests. This documentation shall be in accordance with the Contract and shall include the following as appropriate:

- Model and part number for all material.
- Test equipment model number, serial number, settings, and date of last calibration.
- All strap and switch settings.
- Record of all adjustments and levels.
- Alignment measurements.
- Identification of interconnections.
- All factory, laboratory and site test results.

The Contractor shall submit three copies of the acceptance test plan to the Engineer for approval prior to commencement of acceptance testing. The acceptance test plan shall address the full testing requirements of the specifications. The acceptance test plan shall detail all tests to be performed, the test results which are expected and the test schedule. The acceptance test plan will include the following major test and acceptance categories:

- Physical inspection
- Functional tests
- Performance tests

The Contractor shall test the communication system according to the approved acceptance test plan and shall provide all test equipment, labor and ancillary items required to perform the testing. The Contractor shall notify the Engineer of his intent to proceed with testing 48 hours prior to commencement of each test.

Tests and inspections shall include:

- Visual inspection for damaged or incorrect installation;
- Adjustments and alignment; and
- Measurement of parameters and operating conditions.

Fiber Optic Cable Testing.--Fiber optic cable testing is described in Section 10-4, "Fiber Optic Communication Cable Plant," of these special provisions.

Data Link Testing.--This section is for the alignment and testing of the data system. The activities shall include verification of all data circuits in the low speed data links, high speed data ring network and in the integrated data system.

The test shall be conducted in accordance to an approved installation and test plan.

The Contractor shall adjust levels required for the data system to operate.

Data link tests shall consist of functional tests conducted between the T-1 multidrop communications system and Model 170 controller interface. The audio channel shall be verified in both directions using telephone instruments. The signaling system shall be verified in both directions.

Data link performance tests shall be conducted between the T-1 multidrop communications system at the communication hub and each field element cabinet or device (vehicle detection stations, ramp meters and closed circuit televisions). Records of all tests shall be delivered to the Engineer. Bit error rate tests shall be conducted using (1) asynchronous fiber optic modems at 1200 bps and (2) DS1 optical modem at 1.544 Mbps each configured in a loop back path, from the communication hub to the circuit terminus, looped back into the circuit to the communication hub. A BERTS shall be used in a 2 hour test of each circuit. All circuits shall provide an error rate less than 1 in 10^9 .

All acceptance test results shall be fully documented and such documentation provided as a condition of acceptance.

FUNCTIONAL TESTS

The Contractor shall test all system functions to demonstrate the connectivity of each data channel, that all circuits, and all equipment satisfies the functional requirements of these special provisions.

The Contractor shall document all functional test results. In the event that any aspect of the functional tests are determined by the Engineer to have failed, the Contractor shall cease all acceptance testing and determine the cause of the failure and make repairs to the satisfaction of the Engineer. Acceptance testing shall, at the discretion of the Engineer, be repeated from the start of functional tests.

Performance Tests--The Contractor shall conduct operational performance tests on all data circuits operational from the communication hub to the field equipment.

Data tests shall be performed on all operational and voice/data circuits using appropriate test equipment for the measurement of the following parameters:

One drop of each circuit, as chosen by the Engineer, shall be tested for 48 hours. The average bit error rate in both directions shall be less than 10^{-8} .

Pulse-width distortion shall be defined as the difference between the data pulse width into a data channel port at the communication hub port and the pulse width out of the EIA-232D port of an interconnected drop modem.

Distortion shall be tested between the communication hub and the selected field modem for each data circuit. The signal shall not have a gross span-stop distortion greater than 20 percent at any data interface measured as per EIA-404-A.

If any circuit or element fails to satisfy the specified performance requirements the Contractor shall determine the cause and remedy the failure to the satisfaction of the Engineer. The full performance tests shall be repeated under operating conditions as determined by the Engineer.

FINAL ACCEPTANCE

The system will not be accepted until all of the following conditions have been met as follows:

Physical, functional and full performance acceptance tests have been completed and the results are approved by the Engineer.

All documentation has been completed and submitted to the Engineer.

All connections that were changed to perform acceptance tests are restored and tested.

SYSTEM DOCUMENTATION

The Contractor shall submit a draft copy of all documentation for review and approval prior to production of documentation. The Engineer will review and approve or reject the draft documentation within four weeks of receipt.

Draft documentation shall be submitted eight weeks prior to the start of installation. The draft documentation shall show the general approach in preparing the final manuals.

Upon approval of the draft documentation, provisional documentation shall be supplied 3 weeks prior to the start of site testing. The provisional documentation shall be of the same format as the final manuals but with temporary insertion for items that cannot be finalized until the system is completed, tested and accepted. Final documentation shall be submitted no later than 4 weeks after completion of the acceptance tests and shall incorporate all comments made during the approval stages. The Contractor shall be responsible for all delay caused by non-compliance to the specified requirements.

Final documentation shall be approved prior to its production. Five copies of all final documents shall be delivered. The copies shall be 216 mm x 279 mm and bound in three-ring, hard-covered binders, complete with dividers. Documentation shall consist of a operations and maintenance (O & M) manual with drawings and shall include the information necessary to operate, maintain and repair the equipment and cable to the lowest module or component level described. It shall contain as a minimum the following:

Master Items Index: This shall be the first section of the O & M manual. The section shall describe the purpose of each manual and brief description to the directory of the manual. It shall also reference equipment manuals as required for additional and support material.

System Description and Technical Data: This section shall contain an overall description of the system and associated equipment and cables with illustrative block diagrams. This section shall identify all equipment and cables in the system stating the exact module and option number that are employed in the system. Technical data, specification and settings for every type of equipment or cable shall be provided. Any modification that has been done on the equipment shall be clearly described.

Theory of Operation: The manual shall contain a functional description of each element of the system, explaining how each function is being achieved separately and how each element works together to form the complete system.

Operations: The manual shall describe how to operate the system and each particular type of equipment and software. Equipment layout, layout of controls, displays, software operating procedures and all other information required to correctly operate the system and each functional unit shall be provided. Procedures shall also be provided for initial tune-up of the system and adjustment and checkout required to ensure that the system is functioning within the performance requirements. Warning of special procedures shall be given. The functions and setting of all parameters shall be explained.

Corrective Maintenance: The manual shall include fault diagnostic and repair procedures to permit the location and correction of faults to the level of each replaceable modules. Procedures shall include alignment and testing of the equipment following repair, the test equipment, tools, diagnostic software required and the test set up.

Preventative Maintenance: The manual shall include procedures for preventative maintenance in order to maintain the performance parameters of the system, equipment and cables within the requirements of the specifications.

Parts List: The manual shall include a list of all replaceable parts with exact parts description and number and a directory of recommended suppliers with correspondence address, telephone and fax numbers.

Test Results: This section shall include a copy of the results for all the tests that has been conducted for the contract.

System schematic drawings shall be provided to identify the type of equipment at each location and the function of all equipment. The drawings shall also show how the system is interconnected. A comprehensive list of cabling and wiring shall be provided to clearly identify the interconnection and labeling of all equipment supplied under this contract, State-furnished or existing both in the field and at the communication hub.

10-3.24 REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT

Salvaged electrical materials shall be hauled to 175 W. Cluster Street, San Bernardino, California 92401 and stockpiled.

The Contractor shall provide the equipment, as necessary, to safely unload and stockpile the material. A minimum of 2 working days' notice shall be given prior to delivery.

10-3.25 PAYMENT

The contract lump sum price paid for modify communication hub assembly shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in modifying communication hub assembly, complete in place, including all ancillary or incidental items required to provide full equipment operation at each site, as shown on plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for modify fiber optic system shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in modify fiber optic system, complete in place, including conduit, innerduct, sealing plugs, color concrete backfill, tracer wire, warning tape, fiber optic cables, fiber optic splice vaults, splice closures, splice trays and including all ancillary or incidental items required to provide full equipment operation as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for furnishing and installing the Model 170 controller interface be considered as included in the lump sum price paid for ramp metering system (location 9) and no separate payment will be made therefore.

The contract lump sum price paid for system testing and documentation shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in system testing and documentation, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for hauling and stockpiling electrical materials shall be considered as included in the contract price paid for the item requiring the material to be salvaged and no additional compensation will be allowed therefor.

SECTION 11. (BLANK)

SECTION 12. (BLANK)

SECTION 13. (BLANK)

SECTION 14 FEDERAL REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION PROJECTS

GENERAL.—The work herein proposed will be financed in whole or in part with Federal funds, and therefore all of the statutes, rules and regulations promulgated by the Federal Government and applicable to work financed in whole or in part with Federal funds will apply to such work. The "Required Contract Provisions, Federal-Aid Construction Contracts, "Form FHWA 1273, are included in this Section 14. Whenever in said required contract provisions references are made to "SHA contracting officer", "SHA resident engineer", or "authorized representative of the SHA", such references shall be construed to mean "Engineer" as defined in Section 1-1.18 of the Standard Specifications.

PERFORMANCE OF PREVIOUS CONTRACT.—In addition to the provisions in Section II, "Nondiscrimination," and Section VII, "Subletting or Assigning the Contract," of the required contract provisions, the Contractor shall comply with the following:

The bidder shall execute the CERTIFICATION WITH REGARD TO THE PERFORMANCE OF PREVIOUS CONTRACTS OR SUBCONTRACTS SUBJECT TO THE EQUAL OPPORTUNITY CLAUSE AND THE FILING OF REQUIRED REPORTS located in the proposal. No request for subletting or assigning any portion of the contract in excess of \$10,000 will be considered under the provisions of Section VII of the required contract provisions unless such request is accompanied by the CERTIFICATION referred to above, executed by the proposed subcontractor.

NON-COLLUSION PROVISION.—The provisions in this section are applicable to all contracts except contracts for Federal Aid Secondary projects.

Title 23, United States Code, Section 112, requires as a condition precedent to approval by the Federal Highway Administrator of the contract for this work that each bidder file a sworn statement executed by, or on behalf of, the person, firm, association, or corporation to whom such contract is to be awarded, certifying that such person, firm, association, or corporation has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the submitted bid. A form to make the non-collusion affidavit statement required by Section 112 as a certification under penalty of perjury rather than as a sworn statement as permitted by 28, USC, Sec. 1746, is included in the proposal.

PARTICIPATION BY MINORITY BUSINESS ENTERPRISES IN SUBCONTRACTING.—Part 23, Title 49, Code of Federal Regulations applies to this Federal-aid project. Pertinent sections of said Code are incorporated in part or in its entirety within other sections of these special provisions.

Schedule B—Information for Determining Joint Venture Eligibility

(This form need not be filled in if all joint venture firms are minority owned.)

1. Name of joint venture _____
2. Address of joint venture _____
3. Phone number of joint venture _____
4. Identify the firms which comprise the joint venture. (The MBE partner must complete Schedule A.) _____

 - a. Describe the role of the MBE firm in the joint venture. _____
 - b. Describe very briefly the experience and business qualifications of each non-MBE joint venturer: _____

5. Nature of the joint venture's business _____
6. Provide a copy of the joint venture agreement.
7. What is the claimed percentage of MBE ownership? _____
8. Ownership of joint venture: (This need not be filled in if described in the joint venture agreement, provided by question 6.).
 - a. Profit and loss sharing.
 - b. Capital contributions, including equipment.
 - c. Other applicable ownership interests.

9. Control of and participation in this contract. Identify by name, race, sex, and "firm" those individuals (and their titles) who are responsible for day-to-day management and policy decision making, including, but not limited to, those with prime responsibility for:

a. Financial decisions _____

b. Management decisions, such as:

(1) Estimating _____

(2). Marketing and sales _____

(3). Hiring and firing of management personnel _____

(4) Purchasing of major items or supplies _____

c. Supervision of field operations _____

Note.—If, after filing this Schedule B and before the completion of the joint venture's work on the contract covered by this regulation, there is any significant change in the information submitted, the joint venture must inform the grantee, either directly or through the prime contractor if the joint venture is a subcontractor.

Affidavit

"The undersigned swear that the foregoing statements are correct and include all material information necessary to identify and explain the terms and operation of our joint venture and the intended participation by each joint venturer in the undertaking. Further, the undersigned covenant and agree to provide to grantee current, complete and accurate information regarding actual joint venture work and the payment therefor and any proposed changes in any of the joint venture arrangements and to permit the audit and examination of the books, records and files of the joint venture, or those of each joint venturer relevant to the joint venture, by authorized representatives of the grantee or the Federal funding agency. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under Federal or State laws concerning false statements."

_____ Name of Firm	_____ Name of Firm
_____ Signature	_____ Signature
_____ Name	_____ Name
_____ Title	_____ Title
_____ Date	_____ Date

Date _____

State of _____

County of _____

On this ____ day of _____, 19 __, before me appeared (Name) _____, to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) _____ to execute the affidavit and did so as his or her free act and deed.

Notary Public _____

Commission expires _____

[Seal]

Date _____

State of _____

County of _____

On this ____ day of _____, 19 __, before me appeared (Name) _____ to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) _____ to execute the affidavit and did so as his or her free act and deed.

Notary Public _____

Commission expires _____

[Seal]

**REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS**

I. GENERAL

1. These contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.
2. Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions, and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. The Required Contract Provisions shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions.
3. A breach of any of the stipulations contained in these Required Contract Provisions shall be sufficient grounds for termination of the contract.
4. A breach of the following clauses of the Required Contract Provisions may also be grounds for debarment as provided in 29 CFR 5.12:

Section I, paragraph 2;
Section IV, paragraphs 1, 2, 3, 4, and 7;
Section V, paragraphs 1 and 2a through 2g.

5. Disputes arising out of the labor standards provisions of Section IV (except paragraph 5) and Section V of these Required Contract Provisions shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor (DOL) as set forth in 29 CFR 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the DOL, or the contractor's employees or their representatives.
6. **Selection of Labor:** During the performance of this contract, the contractor shall not:
 - a. discriminate against labor from any other State, possession, or territory of the United States (except for employment preference for Appalachian contracts, when applicable, as specified in Attachment A), or
 - b. employ convict labor for any purpose within the limits of the project unless it is labor performed by convicts who are on parole, supervised release, or probation.

II. NONDISCRIMINATION

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.)

1. **Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, and 41 CFR 60) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The Equal Opportunity Construction Contract Specifications set forth under 41 CFR 60-4.3 and the provisions of the American Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:
 - a. The contractor will work with the State highway agency (SHA) and the Federal Government in carrying out EEO obligations and in their review of his/her activities under the contract.

- b. The contractor will accept as his operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, preapprenticeship, and/or on-the-job training."

2. **EEO Officer:** The contractor will designate and make known to the SHA contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active contractor program of EEO and who must be assigned adequate authority and responsibility to do so.
3. **Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:
- a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.
 - b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.
 - c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minority group employees.
 - d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.
 - e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.
4. **Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minority groups in the area from which the project work force would normally be derived.
- a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group applicants may be referred to the contractor for employment consideration.
 - b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, he is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The DOL has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Executive Order 11246, as amended.)
 - c. The contractor will encourage his present employees to refer minority group applicants for employment. Information and procedures with regard to referring minority group applicants will be discussed with employees.

5. **Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:
- a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.
 - b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.
 - c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.
 - d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with his obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of his avenues of appeal.
6. **Training and Promotion:**
- a. The contractor will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.
 - b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.
 - c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.
 - d. The contractor will periodically review the training and promotion potential of minority group and women employees and will encourage eligible employees to apply for such training and promotion.
7. **Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the contractor either directly or through a contractor's association acting as agent will include the procedures set forth below:
- a. The contractor will use best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.
 - b. The contractor will use best efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.
 - c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the SHA and shall set forth what efforts have been made to obtain such information.

- d. In the event the union is unable to provide the contractor with a reasonable flow of minority and women referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minority group persons and women. (The DOL has held that it shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the SHA.
- 8. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment.
- a. The contractor shall notify all potential subcontractors and suppliers of his/her EEO obligations under this contract.
 - b. Disadvantaged business enterprises (DBE), as defined in 49 CFR 23, shall have equal opportunity to compete for and perform subcontracts which the contractor enters into pursuant to this contract. The contractor will use his best efforts to solicit bids from and to utilize DBE subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of DBE construction firms from SHA personnel.
 - c. The contractor will use his best efforts to ensure subcontractor compliance with their EEO obligations.
- 9. Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the SHA and the FHWA.
- a. The records kept by the contractor shall document the following:
 - (1) The number of minority and non-minority group members and women employed in each work classification on the project;
 - (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women;
 - (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and
 - (4) The progress and efforts being made in securing the services of DBE subcontractors or subcontractors with meaningful minority and female representation among their employees.
 - b. The contractors will submit an annual report to the SHA each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data.

III. NONSEGREGATED FACILITIES

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.)

- a. By submission of this bid, the execution of this contract or subcontract, or the consummation of this material supply agreement or purchase order, as appropriate, the bidder, Federal-aid construction contractor, subcontractor, material supplier, or vendor, as appropriate, certifies that the firm does not maintain or provide for its employees any segregated facilities at any of its establishments, and that the firm does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The firm agrees that a breach of this certification is a violation of the EEO provisions of this contract. The firm further certifies that no employee will be denied access to adequate facilities on the basis of sex or disability.

- b. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive, or are, in fact, segregated on the basis of race, color, religion, national origin, age or disability, because of habit, local custom, or otherwise. The only exception will be for the disabled when the demands for accessibility override (e.g. disabled parking).
- c. The contractor agrees that it has obtained or will obtain identical certification from proposed subcontractors or material suppliers prior to award of subcontracts or consummation of material supply agreements of \$10,000 or more and that it will retain such certifications in its files.

IV. PAYMENT OF PREDETERMINED MINIMUM WAGE

(Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural minor collectors, which are exempt.)

1. General:

- a. All mechanics and laborers employed or working upon the site of the work will be paid unconditionally and not less often than once a week and without subsequent deduction or rebate on any account [except such payroll deductions as are permitted by regulations (29 CFR 3)] issued by the Secretary of Labor under the Copeland Act (40 U.S.C. 276c) the full amounts of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment. The payment shall be computed at wage rates not less than those contained in the wage determination of the Secretary of Labor (hereinafter "the wage determination") which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor or its subcontractors and such laborers and mechanics. The wage determination (including any additional classifications and wage rates conformed under paragraph 2 of this Section IV and the DOL poster (WH-1321) or Form FHWA-1495) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. For the purpose of this Section, contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act (40 U.S.C. 276a) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section IV, paragraph 3b, hereof. Also, for the purpose of this Section, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in paragraphs 4 and 5 of this Section IV.
- b. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.
- c. All rulings and interpretations of the Davis-Bacon Act and related acts contained in 29 CFR 1, 3, and 5 are herein incorporated by reference in this contract.

2. Classification:

- a. The SHA contracting officer shall require that any class of laborers or mechanics employed under the contract, which is not listed in the wage determination, shall be classified in conformance with the wage determination.
- b. The contracting officer shall approve an additional classification, wage rate and fringe benefits only when the following criteria have been met:
 - (1) the work to be performed by the additional classification requested is not performed by a classification in the wage determination;
 - (2) the additional classification is utilized in the area by the construction industry;
 - (3) the proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

- (4) with respect to helpers, when such a classification prevails in the area in which the work is performed.
- c. If the contractor or subcontractors, as appropriate, the laborers and mechanics (if known) to be employed in the additional classification or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the DOL, Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, D.C. 20210. The Wage and Hour Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
 - d. In the event the contractor or subcontractors, as appropriate, the laborers or mechanics to be employed in the additional classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. Said Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
 - e. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 2c or 2d of this Section IV shall be paid to all workers performing work in the additional classification from the first day on which work is performed in the classification.

3. Payment of Fringe Benefits:

- a. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor or subcontractors, as appropriate, shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly case equivalent thereof.
- b. If the contractor or subcontractor, as appropriate, does not make payments to a trustee or other third person, he/she may consider as a part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

4. Apprentices and Trainees (Programs of the U.S. DOL) and Helpers:

- a. Apprentices:
 - (1) Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the DOL, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau, or if a person is employed in his/her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice.
 - (2) The allowable ratio of apprentices to journeyman-level employees on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate listed in the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor or subcontractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman-level hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

- (3) Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator for the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.
- (4) In the event the Bureau of Apprenticeship and Training, or a State apprenticeship agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor or subcontractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the comparable work performed by regular employees until an acceptable program is approved.

b. Trainees:

- (1) Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the DOL, Employment and Training Administration.
- (2) The ratio of trainees to journeyman-level employees on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.
- (3) Every trainee must be paid at not less than the rate specified in the approved program for his/her level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman-level wage rate on the wage determination which provides for less than full fringe benefits for apprentices, in which case such trainees shall receive the same fringe benefits as apprentices.
- (4) In the event the Employment and Training Administration withdraws approval of a training program, the contractor or subcontractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Helpers:

Helpers will be permitted to work on a project if the helper classification is specified and defined on the applicable wage determination or is approved pursuant to the conformance procedure set forth in Section IV.2. Any worker listed on a payroll at a helper wage rate, who is not a helper under an approved definition, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed.

5. Apprentices and Trainees (Programs of the U.S. DOT):

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

6. Withholding:

The SHA shall upon its own action or upon written request of an authorized representative of the DOL withhold, or cause to be withheld, from the contractor or subcontractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same prime contractor, as much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the SHA contracting officer may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

7. Overtime Requirements:

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers, mechanics, watchmen, or guards (including apprentices, trainees, and helpers described in paragraphs 4 and 5 above) shall require or permit any laborer, mechanic, watchman, or guard in any workweek in which he/she is employed on such work, to work in excess of 40 hours in such workweek unless such laborer, mechanic, watchman, or guard receives compensation at a rate not less than one-and-one-half times his/her basic rate of pay for all hours worked in excess of 40 hours in such workweek.

8. Violation:

Liability for Unpaid Wages; Liquidated Damages: In the event of any violation of the clause set forth in paragraph 7 above, the contractor and any subcontractor responsible thereof shall be liable to the affected employee for his/her unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer, mechanic, watchman, or guard employed in violation of the clause set forth in paragraph 7, in the sum of \$10 for each calendar day on which such employee was required or permitted to work in excess of the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 7.

9. Withholding for Unpaid Wages and Liquidated Damages:

The SHA shall upon its own action or upon written request of any authorized representative of the DOL withhold, or cause to be withheld, from any monies payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 8 above.

V. STATEMENTS AND PAYROLLS

(Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural collectors, which are exempt.)

1. Compliance with Copeland Regulations (29 CFR 3):

The contractor shall comply with the Copeland Regulations of the Secretary of Labor which are herein incorporated by reference.

2. Payrolls and Payroll Records:

- a. Payrolls and basic records relating thereto shall be maintained by the contractor and each subcontractor during the course of the work and preserved for a period of 3 years from the date of completion of the contract for all laborers, mechanics, apprentices, trainees, watchmen, helpers, and guards working at the site of the work.

- b. The payroll records shall contain the name, social security number, and address of each such employee; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalent thereof the types described in Section 1(b)(2)(B) of the Davis Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. In addition, for Appalachian contracts, the payroll records shall contain a notation indicating whether the employee does, or does not, normally reside in the labor area as defined in Attachment A, paragraph 1. Whenever the Secretary of Labor, pursuant to Section IV, paragraph 3b, has found that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis Bacon Act, the contractor and each subcontractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, that the plan or program has been communicated in writing to the laborers or mechanics affected, and show the cost anticipated or the actual cost incurred in providing benefits. Contractors or subcontractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprentices and trainees, and ratios and wage rates prescribed in the applicable programs.
- c. Each contractor and subcontractor shall furnish, each week in which any contract work is performed, to the SHA resident engineer a payroll of wages paid each of its employees (including apprentices, trainees, and helpers, described in Section IV, paragraphs 4 and 5, and watchmen and guards engaged on work during the preceding weekly payroll period). The payroll submitted shall set out accurately and completely all of the information required to be maintained under paragraph 2b of this Section V. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.
- d. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
 - (1) that the payroll for the payroll period contains the information required to be maintained under paragraph 2b of this Section V and that such information is correct and complete;
 - (2) that such laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR 3;
 - (3) that each laborer or mechanic has been paid not less than the applicable wage rate and fringe benefits or cash equivalent for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- e. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 2d of this Section V.
- f. The falsification of any of the above certifications may subject the contractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 231.
- g. The contractor or subcontractor shall make the records required under paragraph 2b of this Section V available for inspection, copying, or transcription by authorized representatives of the SHA, the FHWA, or the DOL, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the SHA, the FHWA, the DOL, or all may, after written notice to the contractor, sponsor, applicant, or owner, take such actions as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

VI. RECORD OF MATERIALS, SUPPLIES, AND LABOR

1. On all Federal-aid contracts on the National Highway System, except those which provide solely for the installation of protective devices at railroad grade crossings, those which are constructed on a force account or direct labor basis, highway beautification contracts, and contracts for which the total final construction cost for roadway and bridge is less than \$1,000,000 (23 CFR 635) the contractor shall:
 - a. Become familiar with the list of specific materials and supplies contained in Form FHWA-47, "Statement of Materials and Labor Used by Contractor of Highway Construction Involving Federal Funds," prior to the commencement of work under this contract.
 - b. Maintain a record of the total cost of all materials and supplies purchased for and incorporated in the work, and also of the quantities of those specific materials and supplies listed on Form FHWA-47, and in the units shown on Form FHWA-47.
 - c. Furnish, upon the completion of the contract, to the SHA resident engineer on Form FHWA-47 together with the data required in paragraph 1b relative to materials and supplies, a final labor summary of all contract work indicating the total hours worked and the total amount earned.
2. At the prime contractor's option, either a single report covering all contract work or separate reports for the contractor and for each subcontract shall be submitted.

VII. SUBLETTING OR ASSIGNING THE CONTRACT

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the State. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635).
 - a. "Its own organization" shall be construed to include only workers employed and paid directly by the prime contractor and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor, assignee, or agent of the prime contractor.
 - b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid on the contract as a whole and in general are to be limited to minor components of the overall contract.
2. The contract amount upon which the requirements set forth in paragraph 1 of Section VII is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.
3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the SHA contracting officer determines is necessary to assure the performance of the contract.
4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the SHA contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the SHA has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

VIII. SAFETY: ACCIDENT PREVENTION

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the SHA contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).
3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

IX. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, the following notice shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

Notice To All Personnel Engaged On Federal-Aid Highway Projects

18 U.S.C. 1020 READS AS FOLLOWS:

"Whoever being an officer, agent, or employee of the United States, or any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined not more than \$10,000 or imprisoned not more than 5 years or both."

X. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$100,000 or more.)

By submission of this bid or the execution of this contract, or subcontract, as appropriate, the bidder, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any facility that is or will be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub.L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub.L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR 15) is not listed, on the date of contract award, on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.
2. That the firm agrees to comply and remain in compliance with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations and guidelines listed thereunder.

3. That the firm shall promptly notify the SHA of the receipt of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility that is or will be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.
4. That the firm agrees to include or cause to be included the requirements of paragraph 1 through 4 of this Section X in every nonexempt subcontract, and further agrees to take such action as the government may direct as a means of enforcing such requirements.

XI. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

1. Instructions for Certification - Primary Covered Transactions:

(Applicable to all Federal-aid contracts - 49 CFR 29)

- a. By signing and submitting this proposal, the prospective primary participant is providing the certification set out below.
- b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective primary participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.
- c. The certification in this clause is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause of default.
- d. The prospective primary participant shall provide immediate written notice to the department or agency to whom this proposal is submitted if any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- e. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is submitted for assistance in obtaining a copy of those regulations.
- f. The prospective primary participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.
- g. The prospective primary participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
- h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the nonprocurement portion of the "Lists of Parties Excluded From Federal Procurement or Nonprocurement Programs" (Nonprocurement List) which is compiled by the General Services Administration.

- i. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- j. Except for transactions authorized under paragraph f of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion — Primary Covered Transactions

1. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:
 - a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
 - b. Have not within a 3-year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph 1b of this certification; and
 - d. Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
2. Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Covered Transactions:

(Applicable to all subcontracts, purchase orders and other lower tier transactions of \$25,000 or more - 49 CFR 29)

- a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.
- b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
- c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.
- d. The terms "covered transaction," "debarred," "suspended," "ineligible," "primary covered transaction," "participant," "person," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.
- e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

- f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
- g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.
- h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion — Lower Tier Covered Transactions

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

XII. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

(Applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 - 49 CFR 20)

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:
 - a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
 - b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.
3. The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

FEDERAL-AID FEMALE AND MINORITY GOALS

In accordance with Section II, "Nondiscrimination," of "Required Contract Provisions Federal-aid Construction Contracts" the following are the goals for female utilization:

Goal for Women (applies nationwide).....(percent)	6.9
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The following are goals for minority utilization:

CALIFORNIA ECONOMIC AREA

		Goal (Percent)
174	Redding, CA:	
	Non-SMSA Counties	6.8
	CA Lassen; CA Modoc; CA Plumas; CA Shasta; CA Siskiyou; CA Tehama.	
175	Eureka, CA	
	Non-SMSA Counties	6.6
	CA Del Norte; CA Humboldt; CA Trinity.	
176	San Francisco-Oakland-San Jose, CA:	
	SMSA Counties:	
	7120 Salinas-Seaside-Monterey, CA	28.9
	CA Monterey.	
	7360 San Francisco-Oakland	25.6
	CA Alameda; CA Contra Costa; CA Marin; CA San Francisco; CA San Mateo.	
	7400 San Jose, CA	19.6
	CA Santa Clara.	
	7485 Santa Cruz, CA.	14.9
	CA Santa Cruz.	
	7500 Santa Rosa, CA	9.1
	CA Sonoma.	
	8720 Vallejo-Fairfield- Napa, CA	17.1
	CA Napa; CA Solano	
	Non-SMSA Counties	23.2
	CA Lake; CA Mendocino; CA San Benito	
177	Sacramento, CA:	
	SMSA Counties:	
	6920 Sacramento, CA	16.1
	CA Placer; CA Sacramento; CA Yolo.	
	Non-SMSA Counties	14.3
	CA Butte; CA Colusa; CA El Dorado; CA Glenn; CA Nevada; CA Sierra; CA Sutter; CA Yuba.	
178	Stockton-Modesto, CA:	
	SMSA Counties:	
	5170 Modesto, CA	12.3
	CA Stanislaus.	
	8120 Stockton, CA	24.3
	CA San Joaquin.	
	Non-SMSA Counties	19.8
	CA Alpine; CA Amador; CA Calaveras; CA Mariposa; CA Merced; CA Tuolumne.	

		Goal (Percent)
179	Fresno-Bakersfield, CA	
	SMSA Counties:	
	0680 Bakersfield, CA	19.1
	CA Kern.	
	2840 Fresno, CA	26.1
	CA Fresno.	
	Non-SMSA Counties	23.6
	CA Kings; CA Madera; CA Tulare.	
180	Los Angeles, CA:	
	SMSA Counties:	
	0360 Anaheim-Santa Ana-Garden Grove, CA	11.9
	CA Orange.	
	4480 Los Angeles-Long Beach, CA	28.3
	CA Los Angeles.	
	6000 Oxnard-Simi Valley-Ventura, CA	21.5
	CA Ventura.	
	6780 Riverside-San Bernardino-Ontario, CA.	19.0
	CA Riverside; CA San Bernardino.	
	7480 Santa Barbara-Santa Maria-Lompoc, CA	19.7
	CA Santa Barbara.	
	Non-SMSA Counties	24.6
	CA Inyo; CA Mono; CA San Luis Obispo.	
181	San Diego, CA:	
	SMSA Counties	
	7320 San Diego, CA.	16.9
	CA San Diego.	
	Non-SMSA Counties	18.2
	CA Imperial.	

In addition to the reporting requirements set forth elsewhere in this contract the Contractor and subcontractors holding subcontracts, not including material suppliers, of \$10,000 or more, shall submit for every month of July during which work is performed, employment data as contained under Form FHWA PR-1391 (Appendix C to 23 CFR, Part 230), and in accordance with the instructions included thereon.

FEDERAL REQUIREMENT TRAINING SPECIAL PROVISIONS

As part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The Contractor shall provide on-the-job training to develop full journeymen in the types of trades or job classification involved.

The goal for the number of trainees or apprentices to be trained under the requirements of this special provision will be 12.

In the event the Contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees or apprentices are to be trained by the subcontractor, provided however, that the Contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The Contractor shall also insure that this Training Special Provision is made applicable to such subcontract. Where feasible, 25 percent of trainees or apprentices in each occupation shall be in their first year of apprenticeship or training.

The number of trainees or apprentices shall be distributed among the work classifications on the basis of the Contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment. Prior to commencing work, the Contractor shall submit to the Department for approval the number of trainees or apprentices to be trained in each selected classification and training program to be used. Furthermore, the Contractor shall specify the starting time for training in each of the classifications. The Contractor will be credited for each trainee or apprentice employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees or apprentices as provided hereinafter.

Training and upgrading of minorities and women toward journeymen status is a primary objective of this Training Special Provision. Accordingly, the Contractor shall make every effort to enroll minority and women trainees or apprentices (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees or apprentices) to the extent such persons are available within a reasonable area of recruitment. The Contractor will be responsible for demonstrating the steps that he has taken in pursuance thereof, prior to a determination as to whether the Contractor is in compliance with this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

No employee shall be employed as a trainee or apprentice in any classification in which he has successfully completed a training course leading to journeyman status or in which he has been employed as a journeyman. The Contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used the Contractor's records should document the findings in each case.

The minimum length and type of training for each classification will be as established in the training program selected by the Contractor and approved by both the Department and the Federal Highway Administration. The Department and the Federal Highway Administration will approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and to qualify the average trainee or apprentice for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with the State of California, Department of Industrial Relations, Division of Apprenticeship Standards recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the division office. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Except as otherwise noted below, the Contractor will be reimbursed 80 cents per hour of training given an employee on this contract in accordance with an approved training program. As approved by the Engineer, reimbursement will be made for training of persons in excess of the number specified herein. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the Contractor from receiving other reimbursement. Reimbursement for offsite training indicated above may only be made to the Contractor where he does one or more of the following and the trainees or apprentices are concurrently employed on a Federal-aid project; contributes to the cost of the training, provides the instruction to the trainee or apprentice or pays the trainee's or apprentice's wages during the offsite training period.

No payment shall be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee or apprentice as a journeyman, is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirements of this Training Special Provision. It is normally expected that a trainee or apprentice will begin his training on the project as soon as feasible after start of work utilizing the skill involved and remain on the project as long as training opportunities exist in his work classification or until he has completed his training program. It is not required that all trainees or apprentices be on board for the entire length of the contract. A Contractor will have fulfilled his responsibilities under this Training Special Provision if he has provided acceptable training to the number of trainees or apprentices specified. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.

Only trainees or apprentices registered in a program approved by the State of California's State Administrator of Apprenticeship may be employed on the project and said trainees or apprentices shall be paid the standard wage specified under the regulations of the craft or trade at which they are employed.

The Contractor shall furnish the trainee or apprentice a copy of the program he will follow in providing the training. The Contractor shall provide each trainee or apprentice with a certification showing the type and length of training satisfactorily completed.

The Contractor will provide for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.